U.S.I. JOURNAL

(Established 1870)



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JANUARY-MARCH 1967

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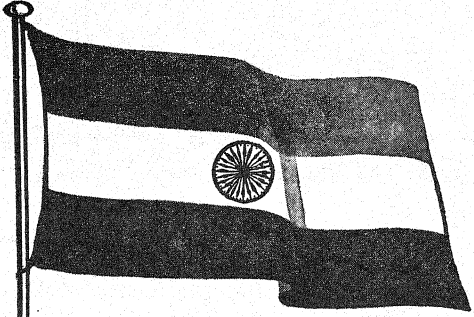
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TO MAKE OR NOT TO MAKE THE BOMB

(An introduction to Systems Analysis)

BY BRIGADIER N. B. GRANT

As the correct solution of any problem depends primarily on a true understanding of what the problem really is, and wherein lies its difficulty, we may profitably pause upon the threshold of our subject to consider first, in a more general way, its real nature; the causes which impede sound practice; the conditions on which success or failure depends; the directions in which error is most to be feared. Thus we shall more fully attain that great prerequisite for success in any work —a clear mental perspective, saving us from confusing the obvious with the important, and the obscure and remote with the unimportant.

—Arthur Mellen Wellington

INTRODUCTION

To make it or not to make it, that is the question! Whereas Hamlet could find a solution to his problem based on a simple mental appreciation, when it comes to making the 'Bomb', the problem has to be analysed at a national, if not an international, level. Normally in respect of a military problem, the soldier proposes, the civil service 'expert' disposes, but it is only a war which really exposes.

In past wars, the initial blow was seldom decisive. India, with the help of Britain, always had time to manufacture its weapons, train its forces, and plan its strategies. Today the possession of nuclear weapons by a possible enemy like China, denies any defender the luxury of a period after the start of hostilities, in which to create or deploy his weapons, or even decide what to do with them. Survival may well depend on a nation's ability to solve the problems of modern warfare far in advance, and solve them in the knowledge that the lessons of previous wars can hardly offer reliable and relevant experience to learn. Much that a future conflict might involve cannot be planned except by mathematical calculation; there is no other way to discover how many missiles are needed to destroy a target system, or how to preserve a communication centre from a 20-megaton near miss, or how to disarm with security.

Systematic, quantitative studies, by physical and social scientists and engineers working in collaboration with the military, have become important in the formulation of defence policy. Their scope ranges upward from increasing the efficiency of routine commercial and industrial housekeeping operations

in a military context (probably their most fruitful role) to advising decision-makers on the broadest issues of national security. The type of study appropriate to this latter role, called "systems analysis", is the subject of this article.

NECESSITY FOR SYSTEMS ANALYSIS

IN the past, a lot of articles and papers have been written by individual authors on the necessity or otherwise of India making the Bomb. Two such articles which warrant consideration, are 'India and the Bomb' written by Maj-Gen. Somdutt, which appeared in the "Times of India", and 'Nuclear Weapons—The Indian Interest' written by William R. Van Cleave and Harold W. Rood for the US Army Command and General Staff College Journal 'Military Review'. Whereas the first was written by a soldier, the latter two authors are political scientists. From time to time the Chairman of our Atomic Commission has also given his views on the subject, in his individual capacity as a scientist. It is understood, that the Government has also constituted a study team to go into this problem. Local politicians have also expressed their individual views on the subject in the Lok Sabha. Thus a wealth of information and opinions are now available in the country, as expressed by individuals and various committees expert in their own fields. However, the decision is nowhere in sight, and the reasons for this are not far to seek.

One way to handle a problem is to turn it over to an 'expert'. His considered opinion can be very helpful if it results from a reasonable and impartial examination of the facts, with due allowance for uncertainty, and if it is made explicit. For if it is explicit, others can use his information to form their own considered opinion. But an expert is even more valuable if his knowledge and opinions can be used in association with other experts. The analytical approach with its models and games, is essentially a device for providing a framework for the systematic exploitation of experts.

Another alternative way to handle a problem is to turn it over to a committee. Now although there is no real reason why a committee should not engage in systematic analysis, this is not likely to happen. Committees usually accept these problems as defined in advance. Given a problem, however, the very first thing that should be done is to determine carefully what the problem really is, and not just study how to make it go away. Committees are much less likely than experts to make their reasoning explicit since their findings are usually obtained by bargaining. A group, more often than not, strives for a consensus, for an acceptable compromise, and for unanimity in place of originality, precision and efficiency.

We trust a man's intuition in a field in which he is an expert. But in complex problems of military force composition or development, we are dealing with a field so broad that no one can be called an expert. A typical systems analysis depends critically on numerous technological factors in several fields of technology; on military operations and logistics factors on both our side and the enemy's; on broad economic, political and strategic factors; and on quite intricate relations among all these. No one is an expert in more than one or two of the sub-fields; no one is an expert in the field as a whole and their interrelations. Thus, no one's unsupported intuitions in such a field can be trusted.

The aim of this paper is not to give a solution to the problem of the bomb as such, but the system that should be adopted for coming to a decision on all such complex matters, including the bomb. It is to a description of the growth, nature and uses of systems analysis, that the rest of the paper is devoted. In a sense this article is a continuation of, and complementary to, a previous article which appeared in the Jan-Mar '65 issue of this journal, under the caption of "Long-Term Planning".

ITS ORIGIN AND MEANING

During the desperate military situation that arose in England in World War II, it occurred to the people responsible for the defence of the country that physicists, biologists, mathematicians, and other highly trained (and highly specialised) people might have something to contribute to what, historically, were almost universally considered strictly military problems. Involving these people was prompted not only by the depth of the crisis, but also by the introduction of new weapons based on technical know-how foreign to past military experience. These weapons and weapons systems (radar is the outstanding example) were so novel in concept and design that their exploitation could not be planned purely on the basis of traditional military experience. New methods of analysis were required. These were developed during World War II and formed the beginning of a body of knowledge called at that time operations analysis, and later, in its various extensions, operations research, systems engineering, management science, cost-effectiveness analysis and systems analysis.

When used in a military context, the label "systems analysis" is applied very broadly to any systematic approach to the comparison of alternatives. Thus, although the character of an analysis addressed to such a problem as improving the operational characteristics of a radar network may be inherently different from one addressed to the problem of increasing the stability of the thermonuclear balance, both would be identified as instances of systems analysis.

In the light of its origins and its present uses, systems analysis might be defined as an inquiry to aid a decision-maker choose a course of action by systematically investigating his proper objectives, comparing quantitatively where possible the costs, effectiveness and risks associated with the alternative policies or strategies for achieving them, and formulating alternatives if those examined are found wanting. Systems analysis represents an approach to, or way of looking at, complex problems of choice under uncertainty, such as those associated with national security. In such problems, objectives are usually multiple, and possibly conflicting, and analysis designed to assist the decision-maker must necessarily involve a large element of judgment.

Today, analytic studies conducted by military agencies, industrial contractors, or organisations, such as RAND of USA, which were explicitly founded to do such work, have come to exert a considerable influence on many military decisions, particularly those dealing with new weapons and weapon systems. In fact, the character of national security problems has changed so much in the last two decades that the military decision-maker, whatever his branch, has almost no choice but to supplement his judgment and experience with the results obtained through systems analysis. To clarify the meaning of systems analysis, it might be especially useful to move from the generality of the definition given above to what that definition implies and assumes. This can perhaps best be accomplished by contrasting systems analysis with purely scientific studies, with operations analysis, and with operations research, narrowly defined.

Systems analysis has a greater complexity and scope than the operations analysis techniques of World War II, despite their common military application. In World War II, analysts were concerned with the day-to-day activities of a military organisation, and not with finding ways to eliminate war, or make it unlikely, or deter it, or if these measures failed, make it possible to survive what could be a catastrophe without precedent. In the area of long-range military planning characteristic of systems analysis, it is necessary to replace the piecemeal component optimizations that operations analysis might provide, by a comprehensive treatment in which emphasis is placed on an integrated, simultaneous examination of every relevant problem.

To sum up, both operations analysis and systems analysis are attempts to apply scientific methods to important problems of military decisions. They have the same essential elements:

(a) An objective or a number of objectives.

(b) Alternative means (or "systems") by which the objective may be accomplished. (These may be different weapon systems, or different strategies of using a weapon system).

(c) The "costs" or resources required by each system.

(d) A mathematical or logical model or models; that is, a set of relationship among the objectives, the alternative means of achieving them, the environment, and the resources.

(e) A criterion for choosing the preferred alternative. The criterion usually relates the objectives and the costs in some manner, for example, by maximizing the achievement of objectives for some assumed or given budget.

OBJECTIVES AND CRITERIA

Our own

The selection of objectives and criteria is frequently the central problem of the design of any systems analysis. What do we really want our systems to accomplish? How do we test the alternative systems to see which accomplishes our objectives the best? We have seen that in the typical World War II operations analysis problem, fairly simple, obvious ways out of these difficulties could usually be found. So many things were fixed or given.

Consider, by contrast, the problem of choosing bombers and missiles to include in the IAF of the middle seventies. What are the relevant objectives? What do we want our Air Force to accomplish? Deterrence, of course. But what kind? Deterrence of a surprise Chinese all out attack on India, or deterrence of a local Pakistan aggression in the J&K only? These may have very different implications for force composition. How do we measure deterrence in a quantitative manner? And is deterrence the only objective? Obviously not. If possible we also want an Air Force that will strengthen our alliances, that will not trigger an accidental war, and that will fight effectively if deterrence fails. But if we are to make a choice, we have to have a criterion or rule by which we can at least measure deterrence approximately.

The answer to the above questions is difficult. But they have to be answered, and answered right by our Foreign Office, if our systems analysis is to be worth anything. Working out a systems analysis with a bad criterion is equivalent to answering the wrong question. It is very easy to choose a criterion for a force composition, or development problem that will ensure our choosing the optimal systems for the wrong war at the wrong time, no matter how sophisticated the rest of the analysis is. The 1962 NEFA debacle is an example.

Military problems should start and end with the military objectives or, better, with the political objectives that the military means serve, and with the obstacles to obtaining these goals. In the process of analysis, however, such objectives are almost certain to be defined and are very likely to be drastically altered. In the post Independence period, it is apparent that we have pursued a number of apparently distinct, but evidently related, broad aims in developing our strategic forces; to deter or to fight; and to have both these capabilities for the ease of either local border skirmishes or an aggression on our homeland itself. Our aims here are not simply altruism. The occupation of Azad Kashmir has vastly increased the dangers to that State, and with the growth of Chinese nuclear capability, a threat to India itself becomes increasingly direct and immediate. We want then to deter direct attack on ourselves, and, if we do not succeed, to come out as well as could. Moreover, these aims of our strategic threat have had many complex connections with other broad goals. They link directly with the possible uses of our own allied ground, sea and tactical air forces in local or global wars.

In brief, the things we want or that might be affected by military choice are extremely varied. They range from things that might be nice to have though some we might willingly settle for, to others we would take as the minimum necessary for the life of our society; and they include alliance goals, as well as interests extending beyond our allies to friendly neutral powers. In a limited sense, they extend even to our enemies since we have limited interests in common with them.

The Enemy's

In discussing the objectives which a military systems analysis might help to further, we have said nothing of the enemy's objectives and the objections he might have to fulfilling our own desires. It is part of the essence of the problems we are considering that they must always be looked at symmetrically. The enemy has a variety of goals which are counterparts of ours and sometimes in direct conflict with them. (He also, fortunately, has some goals in common with us, but not enough to make our problem as simple one). Clear as this is in principle, it is frequently forgotten both by analysts and decision makers. It is not easy to introduce the enemy into our calculations in a way that assigns him the degree of freedom, which he in reality has, to frustrate our simple desire to maximize our safety at his expense. In considering the enemy's active defence through which our offensive system must penetrate, do we take into account the devices available to exploit the peculiar weaknesses of each of these systems? In most of the analysis we have known, either formal systems analysis or staff papers, this does not happen.

How should a systems study deal with uncertainties as to the enemy's capabilities and intentions? One way of avoiding the problem, where the enemy is considered at all, is to limit consideration only to some fixed composition of offence or defence, which is not allowed to shift in response to aspects of our strategy certain to be known to him. This makes a comparison of alternative systems subject to at least an unconscious bias in favour of systems that deviate from the norms that this fixed force might have been invented to counter. It also makes the problem of meeting the enemy too easy. We assume some fixed combat ceilings for his fighters and then devise a bombing force capable of flying slightly higher. Or, we assume some specific limit to the range of his local defences and then work out a device for sending off bombs from just outside this boundary.

What is the alternative to this? To assume no resource performance constraints on his part at all? This also would simplify analysis by making the problem insoluble. If our resources are limited and his are not, not much calculation is required to obtain the result. We hardly benefit by merely assuming that we have an absolute defence against his hypothetical absolute offence. There is a germ of wisdom contained in such attempts to release the enemy of any constraints whatsoever. It suggests that, in addition to trying various reasonably estimated constraints, it is good to find the enemy capability at which our strategy breaks down. This, of course, will always occur at some finite point of enemy capability.

To sum up, the only sensible assumptions we can make about enemy behaviour in dealing with problems where his interest is strictly opposed to our interest are that the enemy will adopt his behaviour, within the limits imposed by whatever flexibility he has, to what he knows about the decisions we are making; that he will design his system to keep flexibility and to confront us with uncertainty; and that he will anticipate our doing the same thing.

MATHEMATICAL MODEL BUILDING — AN AID

A systems analysis is an attempt to discern and answer questions of importance in choice of policy. A mathematical model is frequently a most useful device in obtaining answers to these questions. We shall consider a model to be a black box into which we feed inputs (reliabilities, defence strengths, etc.) and out of which we get outputs. The model is a deliberately simplified picture of a piece of the real world; from its output we seek guidance for some decision problem in the real world. When we say that an analyst builds a model of a part of the real world, we mean that —

(a) he decides which factors are relevant to the questions his study is attempting to answer,

(b) from these he picks those quantifiable factors that can be described numerically,

(c) this list is cut down to size by aggregation,

(d) the relations between the elements are spelled out quantitatively.

This activity is, in part, what anyone does who thinks about a problem. (We have been speaking prose all our lives without realising it). The model builder merely does these things explicitly and quantitatively, his assumptions laid out on the table for any man to inspect and criticise.

Today, we can have a mathematical model in which a human is an integral part of the machinery of the model. We can make the man part of the model, for example, by giving him potentiometer knobs to twist, and dials from which to read the values of variables in an analogue computer. The man continually interacts with the other elements of the model; when he turns the potentiometer knobs he affects the rest of the machinery by changing the values of some of the variables in the model; in turn, the rest of the machinery affects the man as he reads from the dials the values of variables of the model.

If our model includes two or more of these human decision-makers engaged in a competitive struggle, then we say that we have a war game. In one such example at RAND, if you were one of the humans used, you would find yourself cast in the role of a theatre Air Commander deciding how to allocate your forces of fighters, fighter-bombers, tactical missiles, and atomic weapons to enemy targets of airfield, supply lines, and troops. Your opponent has similar decisions to make, and the two of you sit twisting potentiometer knobs to allocate the desired percentages of your forces to the several targets.

A mathematical model, whether a large scale one using a high speed computer, or using slide rule, pencil and pad, can be useful tool in assisting the analyst to arrive at solutions to difficult problems in the real world. The model must be handled by analysts who understand its capability and limitation. To attempt to use a model as a modern, electronic version of the Delphic oracle, from which one may request answers to large and difficult decision problems, invites non-sensical results.

COST ANALYSIS

In comparing the costs of military systems, we prefer to speak of "cost analysis" rather than "cost estimation", because the identification

of the appropriate elements of cost (the analytical breakdown of many complex, interrelated activities and equipment) is so important a part of the method. Weapon systems cost analysis is much more than an estimate of the cost of the weapon itself. Weapon procurement cost may be relatively small compared to other necessary costs, such as base facilities, training of personnel, and operating expenses; and these other costs may vary greatly from system to system. Moreover, in comparing and programming future system as far as five or ten years ahead, the costs of research and development must be taken into account. Recent experience indicates that research and development costs are rising relative to the other costs, and may be expected to rise further as technological change accelerates. In comparing alternatives, therefore, it is necessary to estimate the cost of the complete system, including directly related support costs, over the whole time period from the beginning of its development to its activation, and on through its subsequent operation while still in the active inventory.

What specifically do we mean by cost? In an economic sense, the cost of something means the resource drain on the economy caused by the attainment of that something. Thus the economic cost of national security is measured by the resources allocated to the accomplishment of that objective.

In conclusion, the importance of the basic cost-estimating technique should again be emphasized. It is easy to get carried away by elaborate display boards and other fancy display devices. However, without a reasonably good cost-estimating method, there is really no basis for considering the use of sophisticated presentation devices. To produce results useful in planning and programming deliberations, the cost-estimating method must, as a minimum, stress the following major characteristics:

(a) Total activity cost concept oriented toward identification of meaningful "end product" activities, for example, weapon and support systems.

(b) Distinction among R&D, investment, and annual operating costs.

(c) Incremental costing.

(d) Time-phasing of systems and forces and the related costs.

(e) Emphasis on those system cost components that are relatively most important and that are particularly sensitive to changes in weapon characteristics or methods of operation.

(f) Emphasis on consistency of method in costing alternative weapon proposals.

(g) Recognition of the problem of uncertainty.

ANALYSIS FOR MILITARY DECISIONS

In military problems, there are always considerations not subject to any sort of quantitative analysis. To achieve efficiency in a military context, factors other than cost-effectiveness are important, e.g. discipline, morale, *esprit de corps*, tradition, and organisational behaviour. Such problems involve more than purely military questions. The size, composition, location, and state of readiness of forces influence our foreign policy and the freedom of action we have there. They also have a major impact on our domestic economy and public morale. The men who must somehow integrate these factors with the study are really doing systems analysis, but at a level so high that it is hard to consider it as such.

To form a basis for recommendations, any military systems analysis must at the very least give adequate consideration to the following:

(a) The objectives, both of the nation as a whole and of the forces that are to implement these national objectives.

(b) The military capabilities required to attain these objectives.

(c) The enemy capabilities and objectives.

(d) The technological possibilities.

(e) The effectiveness of each posture, system, or plan considered.

(f) The costs or resource implications of the choices.

(g) The uncertainties in the above.

In the end, military decision-making, like systems analysis itself, is an art. After a certain stage, calculation may no longer be helpful. There are always considerations that cannot be measured, for example, the importance of military gains against political losses, or public reaction to a temporary setback against the enhanced chances of a long-term gain. Moreover, there are always considerations that have been measured or determined by judgment, but not to the decision-maker's satisfaction.

IN RETROSPECT

Much debate in recent times has centered on the problems of government choice among the "cardinal" alternatives confronting our society, that is, the life and death issues; the decision to develop the Bomb, or to go all out on the ballistic missile programme, and so on. These choices involve advanced technology, the disposition and operation of military forces, and a great many political, military, economic, and technical estimates which are intrinsically undertaken. Some of these estimates

must be concealed because of the possibility of hostile use of the information. Such decisions are all too fallible, yet the exigencies of time, and the need for many sorts of specialised knowledge, as well as the requirements of secrecy, unfortunately limit the opportunities for criticism. There can be no final "solution" to such problems. They can only be reduced or made somewhat more manageable. However, the systematic and explicit character of a system's study does widen the possibilities of criticising it, and so reduces to this extent the possibility of error.

It has lately become fashionable to suggest that arms control conferences could settle issues easily if only the participants were sincere. Sincerity undoubtedly has something to do with it, but is hardly the whole of the story. Decisions on arms control, even more than decisions on arms, are extraordinarily complicated. By pointing to the complexity of the decision-maker's problem, we do not mean to suggest that sensible decisions are impossible without systems analysis. In fact, it is quite clear, that several have been made. Some of the million alternatives can, with immunity, be dismissed by a sensible fellow, whether an analyst or a decision-maker. On the other hand, it is also plain that frequently in the past very important alternatives have been ignored. And while systems analysis is no guarantee that we will consider all the relevant, important alternatives (systems analysis is no substitute for common sense) it does force much greater explicitness, and it does make the alternatives examined and the omissions a little more open to scrutiny.

A long range military problem is comparable, for example, to the problems of the owner of a racing stable, who wants to win a horse-race to be run many years hence, on a track not yet built, between horses not yet born. To make matters worse, the possibility exists that when the race is finally run the rules may have been changed, the track length altered, and the horses replaced by greyhounds. Yet, in spite of such uncertainty, analysis can help.

CONCLUSION

Analysis cannot entirely replace other approaches, but it can help build a framework in which they operate more profitably. It is no magic device to eliminate all uncertainty from decision-making, and the systems analyst does not believe that he can read the future or that his mathematical models will prove a sure guide to tomorrow. He does believe, however, that to solve successfully the problems of this hazardous world, it is necessary to use all the available resources of experience, of judgment, of intuition, and of analysis.

Coming now to the actual problem in hand, in the ultimate analysis, the possession of nuclear weapons by India makes sense only if a Chi-

nese attack against it is more than likely. If it is considered to be inevitable, then there would be no alternative but to acquire the weapons whatever the cost. One can pay a political price and obtain such weapons from America or Russia, or alternatively one may choose to pay the economic cost by building them at home. If, on the other hand, a nuclear attack from China against us is not considered to be so inevitable, then we can turn our attention to more urgent problems at home. The clearest possible understanding of Chinese foreign policy objectives and her nuclear strategy is, therefore, indispensable. This is why the subject must be removed from the sphere of doctrinaire speculation with its self-fulfilling prophecies and propaganda, and taken to the sphere of very expert data-gathering, and analysis. Hamlet did, in the end, decide; and so must we.

The author wishes to thank the following gentlemen for making use of ideas and quoting from the works mentioned against them—

(a) ES QUADE: *Introduction to Analysis*

(b) CJ HITCH: *Analysis for Air Force Decisions*

(c) RD SPECHT: *The Why and How of Model Building*

(d) RN McKEAN: *Criteria*

(e) MALCOM W. HOAG: *The Relevance of Costs*

(f) ALBERT WOHLSETTER: *Analysis and Design of Conflict System*

(g) ES QUADE: *Methods and Procedures*

(h) TC SCHELLING: *Assumptions about Enemy Behaviour*

(i) GH FISHER: *Costing Methods*

THE WILL AND MORALE OF THE PEOPLE

BY LIEUT-COLONEL PAUL VARMA

FAVOURABLE economic circumstances* are a major contributory factor to the military potential of a nation, but do not of necessity confer prosperity, high living standards, industrial strength or even military power. Unless suitably endowed in terms of natural resources and economic development, a nation is certainly handicapped while its strategy and policies in peace and war are conditioned, if not shaped, by economics as well as by geography. Progress may be retarded or even denied by unfavourable natural environment: climatic conditions in Tundra lands have restricted its peoples to rudimentary monotype economics, e.g. the reindeer economy of the Lapps, and it is unlikely that standards of life there will improve very much; similar limitations apply to the nomadic tribes of the Sahara and Arabian deserts. These are extreme examples where, so far, there has been no economic inducement strong enough to attract settlement in such uncongenial climate. Where sufficient economic attraction is found and provided the population is sufficiently robust, enterprising and resourceful, settlement and development will take place despite severely adverse natural conditions. The development of the oil-bearing regions of West Asia, the opening up by Canada of its Far North, United States projects in Alaska and the new U.S.S.R. settlements in North Siberia are examples that suggest that human endeavour and ingenuity can yet be applied to win more resources from nature and further improve environments. This spirit of human enterprise, adventure and determination to harness nature's resources and prevail upon her to yield up her riches has generated prosperity where there was poverty and had made modern progressive nations where there were loose groupings of backward tribes. Early histories record that the fall of civilizations was often due to the arrival of a new military power that had arisen outside of the then existing centres of civilization —the 'Golden Hordes of Genghis Khan' and the Assyrians.

THE HUMAN FACTOR

It was the productive areas of the world that attracted predatory militarist nations and the major wars in history have been fought, in the main, in proximity to them. North America, and Australia illustrate how the richest combination of mineral resources and natural wealth avail nothing in the absence of human ability to utilize them. The original

* See Part I—The Economic Base to Military Security (October-December—1966).

inhabitants of North America, the so-called Red Indians, were all but annihilated by settlers from Europe despite the vastly inferior numbers of the latter; this was possible principally on account of the superior knowledge of the settlers, especially in the field of weapons and mechanics rudimentary though they were in those days. Subsequently, the determination and pioneering enterprise of these settlers were rewarded a thousandfold as the virgin soil and untouched mineral resources of the continent yielded up their riches. All this potential wealth, the present-day foundation of the economic, political and military power of the United States, lay dormant and unexploited under the bison economy of the North American Indian tribes. The Australian story is similar. The profound effects of the human factor are further emphasized by the contrasting illustrations of Japan and Switzerland. Unlike the United States or Australia, both are small countries with meagre natural resources. The one consists of several islands off major trade routes while the other lacks a coastline altogether. Both have high percentage of economically unusable land, being mountainous. Despite these limitations, they have developed into modern, industrialized states; one by general competition in world markets, the other by ultraspecialization. Clearly, then, whether or not favourable geographic and economic circumstances exist, we should look more to the character of nations and their ability to control and improve upon their environments as being more truly indicative of their strength and potential. At the same time, such analyses and evaluations, involving as they do national psychologies, present considerable difficulty. The considerations involved are intangible, shifting and variable; they all the time react and interact severely and differently according to a similarly complex impingement of world events. All too often their key lies in the metaphysics of national tradition and character defying definition or form, except at times of momentous significance in national histories.

The crux of all problems of human society lies finally in the individual and collective capacities of the people who are its members. This could not be put more succinctly than in the words of Jawaharlal Nehru: 'We require not only money but, what is far more important, trained human material: in fact, that is the only thing in the ultimate analysis, whether it is industrial or in any other department of life.' ... Mr. Nehru went on to say that there was insufficient trained human material in every aspect of life in India. Clearly, the human factor determines the prosperity, welfare, defence and general standing of a nation ultimately.

In the evaluation of defence and military potential of India the greatest importance should be attached to the characteristics and condition of its people. On our ability to utilize and maximize our not inconsiderable natural advantages, to minimize legacies of impoverishment

and exploitation and to overcome the economic disadvantages arising out of our late entry into a highly competitive, defence-burdened, modern world depends not only our welfare but our very survival and the stability of the Indian Ocean region as a whole.

MALTHUSIAN THEORY

The population of the world is estimated at well over 2,000 million[1]; the largest sources of error in this estimate are China and Africa. India's population is approaching 500 million. While actual population figures are a matter of conjecture, except in a few countries where reliable census figures exist, there is no doubting the significance of world population increases. What appears to be a small increase arithmetically may assume alarming proportions within a few decades.[2] In the post-war years there has been a revival of Malthusian views on population growth.[3] The thesis of Thomas Robert Malthus is that population, if unchecked, increases in geometrical ratio while subsistence increases only in arithmetical ratio; that population always increases up to the limits of subsistence and is only checked by war, famine, pestilence, and the miseries of over-population. These views were put forward by Malthus and others at a time when England's rapid industrial growth had led to the final break-up of the old agriculture-based society and the emergence of a new class of factory workers, living in towns under appalling conditions, rivalling those found in India today. Despite these conditions, there was a steep net population increase then in England as there is in India today. In the West, rising prosperity, a century of world economic expansion into virgin lands, technological advances such as increased crop yields by the use of chemical fertilizers and improved seed, canning, refrigeration, and even though there was no large population reduction due to war, famine or pestilence, led to the discounting of Malthusian doctrine although, significantly, his hypothesis has never been refuted. The theoretical dilemma of over-population has always been incipient and is reflected in the Italo-Ethiopian War (1896), German and Italian demands for colonies, the German geo-political demand for *lebensraum*, various incidents over Indian as well as Chinese and Japanese settlement in the United States, the former Netherlands East Indies, Australia and elsewhere.

1. L. D. Stamp: **Our Underdeveloped** World (Faber, London, 1953.)

2. "The difference between a 1% annual rate of increase and that of 2% is enormous. In 50 years it makes the difference between a population rise of 64% and 169%."—C. F. Rinehart, **Armament Production Potential** (New York, 1953.)

3. See G. F. McCleary, **Malthusian Population Theory** (Faber, London, 1953), D. V. Glass, **Introduction to Malthus** (John Wiley, New York, 1953.)

Today, world population again threatens to exceed subsistence resources but the problem must be viewed against a rather different background than that which obtained a century ago. There now remain few areas awaiting easy settlement and this is offset only in part by the mastery of new techniques which render settlement easier, minimize discomforts or improve existing agriculture. The era of colonial expansion which relieved population pressure in the imperial country, often at the expense of the natives of the colony, appears to be over. The many newly independent countries of the region have to find their own solutions to their own population problems which tend towards excess number in relation to existing means of subsistence, rather than sparseness. Solutions, so far, have taken the form of increased industrial employment, popularization of birth-control measures, land reclamation and development projects. Less progressive reactions are reflected in the racial segregation policy of South Africa (Apartheid), the administrative policy in Kenya, which led to 'land hunger' and in turn the Mau Mau movement, and racial antipathies towards the Chinese populations of Malaya and Indonesia and towards Indian communities in Ceylon, Malaya, Burma and several new African countries.[4] Population density should also be considered in relation to political units as well as physique, climate, resources and strategic location.[5]

DENSITY OF POPULATION

Dense population concentrations are found in the great fertile Gangetic plain (400 per square mile; 245 for India as a whole) throughout its length. Compare it with Java (500 per square mile) but the natural richness of her volcanic soil combined with climate conditions permit of three major harvests a year. Moreover, the southern tip of India, Kerala, has a density of 400. Singapore has 3,300. Certain other parts of Malaya, Bangkok (Thailand) and Saigon (Vietnam) are as densely populated. The largest population centres are Delhi (over two million), Bombay (over three million), Madras (1.2 million) and Calcutta (over four million). Bangkok has one million and Singapore 750,000.

With the exception of the Gangetic plain, and one or two areas in South India, the growth of towns is clearly attributable to their location and importance as ports and centres of contact for overseas trade

4. These policies are termed 'less progressive', as ethically and sociologically they are. This does not imply, however, that the attitude of these and other minority groups towards the countries in which they permanently reside is always correct; in most instances it is equally at fault.
5. See W. S. & E. S. Woytinsky: **World Population and Resources** (New York, Twentieth Century Fund, 1953); J. B. Condliffe: **Economic Patterns of World Population** (National Planning Association, 1943, Washington D.C.)

rather than to industrial concentration, as in the West. However, industrial growth is taking place, in the main, around existing ports and cities but new towns are also growing up at or near the sites of natural resources, as in the case of Durgapur, Jamshedpur in East India, Bangalore (South India), etc.

TWO ASPECTS OF DEMOGRAPHY

Only shortly before the total debacle of French arms in 1940, French leaders had proclaimed their own forces to be the finest in the world.[6] In the event, the French in 1940 were found wanting in each and every military aspect. They suffered the supreme military ignominy of surrender 'en rase campagne' and were subjected to the meanest political abjection Hitler's mind could devise: the signing of the surrender instrument at Versailles under conditions resembling Germany's surrender—but after a four-year struggle—to France in 1918. This French failure is attributable essentially to the general unfitness of that nation, at that time for war. Unfitted mentally as well as physically, both in absolute terms as well as in comparison with Germany, France fell as surely as a rabbit paralysed by fear must succumb to the stoat.[7] Nor is this an isolated instance in military history: the collapse of Babylon before the Assyrian onslaught, the crumbling of ancient Egyptian power, the decline and fall of the Roman Empire, and the break-up of Moghul power are but a few instances of defeats suffered because in some vital respect these nations were unfit to defend their countries in time of war. The close correlation between industrial strength in peace and war potential has been stressed in the economic section of this study. From every point of view a similar relationship can be traced between the general mental and physical fitness of a nation and its fitness for war. Other than morale, which is considered a little later, there are two aspects of demography which demand examination from the military angle: general health and education. The limits that general health places on military potential can be illustrated by reference to examples from the two world wars.

6. "You ask me my opinion of the French Army. I believe that the French Army is a more effective force than at any moment of its history. Its material is first-rate, its fortifications are first-class, its morale is excellent...."—General Weygand, 4th July 1939; "We have gone to war with a 1918-Army against a German Army of 1939"—General Weygand, May 1940, quoted by Sir E. L. Spears in **Assignment to Catastrophe**, Vol. I, p. 190. (Heinman, London, 1955.)

7. General Hurault stated (at the Riom Trial) that the Germans found intact the equipment of 25 divisions. Sir E. L. Spears op. cit., p. 190.

HEALTH AND MILITARY POTENTIAL

First, natural immunities and acclimatization:—These are conditions acquired but slowly; where nutritional standards are low, as in India, sudden exposure to new infections can produce virulent reactions. When the first Indian corps was despatched to France during World War I it was feared that Indian troops might succumb to sickness in unduly large numbers due to the difference in climate.[8] Owing to medical preventive measures these fears proved to be unfounded then, as they were during World War II. What did happen, however, was that an epidemic of influenza which began in Europe spread to India where it caused several million deaths—the influenza was probably brought back by the contingent where it assumed virulence among the debilitated general population lacking natural resistance to it. Similarly, there were limited outbreaks of malaria in malaria-free Britain after both wars, brought in by the repatriation of malaria-infected soldiers.[9] During World War II, British and American troops employed in the Eastern theatres succumbed in far greater numbers to malaria in particular, before the introduction of Mepacrine and Paludrin, as well as to various intestinal disorders.[10] Secondly, World War II placed the greatest stress on industrial and manpower potential that the then British Commonwealth and Empire had faced. India used to be Britain's largest single source of manpower. During World War II, the strength of India's armed forces exceeded two million, mainly non-technical soldiers. However, this contribution is small in relation to the overall population of India. Nevertheless, it proved extremely difficult to find further manpower to keep the figure at two million. Even if conscription was applied, it is doubtful whether India could have increased the proportion of her uniformed force to anything approaching Western mobilization as a very large part of the population would have been below acceptable medical or educational standards.

With the exception of the European stock settled in South Africa and West Australia, African and other Asian peoples also have low standards of nutrition and general health, the root cause of their poor physical condition being economic impoverishment and inadequate diets. Comprehensive health and welfare coverage, by means such as national health and social security schemes, are quite beyond the

8. J. W. N. Mereweather and Sir P. E. Smith: Indian Corps in France (J. Murray, London, 1917.)

9. Alexander the Great is said to have died of malaria.

10. Cf. Lord L. Mountbatten, Report on SEAC (H.M.S.O., 1951). Casualty rates were: Sickness, 1942: 850 to 1,000 per annum; 1945: 500 to 1,000 per annum. Battle casualty to sickness rates, 1943: 1 casualty to 120 sick; 1944: 1 casualty to 20 sick.

financial and technical resources of India at present although the aim is to emulate more advanced countries in these fields. Doctors, nurses and hospital beds are all far below the norm of more prosperous countries.[11] The pattern of population structure in India and adjacent countries is generally well known: fecundity is high; social institutions and practices tend to make for high birth-rates, offset only in part by the death-rate and expectation of life. There is a consistent net increase in population,[12] adding pressure to lands already over-populated in relation to the state of their agricultural development. It should be noted, however, that this over-population does not apply to industrial potential, largely unexploited, nor to many agricultural areas if improved methods of farming were introduced. Disease is rampant and in addition to essentially tropical diseases such as malaria, filaria, typhus, plague, yaws, and amoebiasis, there is also an unduly high incidence of the typical diseases of impoverishment: tuberculosis, fatal respiratory illness, anaemia, rickets and bone malformation, trachoma, skin infections, etc. The care of children, and of adolescents, and ante-and post-natal arrangements are insufficient at present. As would be expected under these conditions, physique tends to be poor, stamina is lacking and resistance to disease other than hereditary, inborn immunities, is weak. To offset this, our people, inured to their frugal existence, can perhaps endure hardships with greater stoicism than others reared in a more favoured environment. Ice-cream, soda fountains, frigidaires, and concert parties need not be included in Indian Army baggage trains! The incidence of mental disorders is probably lower in India than in industrialized countries, although reliable statistics are lacking. This generalization of poor physique and health has notable exceptions. In the northern part of India the climate is more favourable to agricultural life, being bitterly cold in winter and extremely dry and hot in summer. Wheat and maize, dietetically superior to rice, can be grown and form the staple diet, and a rather better-nourished peasantry

11. E.g:

	U.K.	INDIA
Doctors	1 : 1,000	1 : 6,000
Nurses	1 : 300	1 : 43,000
Pharmaceutists	1 : 3 doctors	1 : 4,000,000
Dentists	1 : 2,700	1 : 300,000

(Source: R. Owen, **India**, H.M.S.O., 1949)

12. E.g.:

	Population 1940	Population 1950	Rate of Increase (%)
Pakistan	70.243	75.687	0.75 per annum
India	314.830	356.892	1.26 per annum

However, contrary to general belief the net population increase in many 'advanced' countries exceeds these figures; e.g. United States: 1.36, 1940-50; Canada: 1.79, 1940-50. See L. D. Stamp, **Our Underdeveloped World**, p. 27.

of good physique is found. However, nowhere do these more favourable conditions appear to have led to any greater advance in the overall way of life in any sphere. While a variety of circumstances may be ascribed to this failure to exploit environment, one very valid reason is the political instability and war that has been the curse on particularly Northern India for a thousand years.

THE IMPORTANCE OF EDUCATION

'Upon the education of the people of this country the fate of this country depends.' These were opening words of a United Kingdom White Paper on British education published towards the end of World War II. Significantly, it was made by a country with a mature system of education and was repeated in a Government of India Report.[13] India though inadequately provided with educational facilities according to world standards, is exceptional in the field of education, as in many others Despite centuries of war and disorder, despite—in part, because of British Rule up to 1947, Islamic and Hindu culture, India has excellent foundations upon which to build and extend her national education programmes. India has produced many original thinkers, philosophers, skilled diplomatists, generals and soldiers of repute and some scientists in the post-war world. Although better placed than our neighbours in the field of education, we suffer from the characteristic defects of the system of education grafted and promoted by British administrators in their dependencies and colonial possessions. Educational programmes, under typical British colonial practice, have always been highly selective; actually and comparatively greater facilities were open to the more economically favoured part of population than to the impoverished majority. Stress was laid on higher education, basic education being neglected; urban areas benefited rather more than did the rural; per capita expenditure on education is still low; the classics and arts received emphasis but technical and scientific education was not promoted with any sense of urgency. This system has produced in India, as well as in Pakistan and to a lesser extent in Burma, Ceylon and Malaya, a small well-educated intelligentsia with a tendency to reject its own national cultural background while scientific and technically qualified personnel have arisen despite the educational system, rather than as one of its products. Often highly competent in fields such as law, philosophy, metaphysics and the arts generally, their acumen has also been transferred to the fields of Government administration and the defence services. They, however, tend to become a class apart. Even educational institutions have not absorbed an ample quota of this better educated class. There is an all-too-large surfeit of certificates and degrees, which has resulted in graduate

13. Report on Education, Government of India, 1944.

qualifications being demanded for such humble posts as postmen or clerks drawing Rs. 100 per month. Nevertheless, on balance, India, and to an extent Pakistan, are at a distinct advantage on account of their system of education, unbalanced and incomplete though that may be. Other countries of recent colonial status have not been as fortunate. Indonesia lacks a comprehensive system as well as a sizable educated minority. The new state of what was hitherto French Indo-China lacks broad education apart from a few missionary-inspired schools. Burmese education in common with all else there, has suffered on account of prolonged disorders. The same applies to Malaya although as a colony she also derived certain benefits comparable to those in India and Pakistan. In Thailand, for long an independent country, educational facilities have not yet been made generally available. The various colonial territories along the seaboard of East Africa also lack adequate educational facilities.

Elementary and general educational standards are of the greatest importance in the life of a nation, but technical training colleges are more indicative of ability to produce the multifarious, recurrent needs of the modern state in peace and war. The importance of education in industrialization was realised before the war even in some of the then colonial countries.[14] A modern infantry division has more than 20% of its personnel who in greater or lesser degree may be termed technicians and require some sort of technical training. Even this proportion is an underestimate, for it does not include, for example, the large number of semi-specialists in even the least technical of arms, the infantry. A modern naval cruiser will have some 40 to 60 per cent of its company as technicians in greater or lesser degree.

MANPOWER VERSUS FIREPOWER

In the post-war years great controversy has raged over the issue manpower versus firepower, the Comintern Powers and China representing the former and industrialized countries of the West the latter.[15] The leeway made up by the U.S.S.R. particularly in the firepower sphere has perhaps weakened the argument of the manpower protagonists. However, the weakness of their case was probably better realised by the countries having adequate manpower than it was in the West. Manpower protagonists put forward the United Nations withdrawal in Korea as an example

14. Indian Committee of Enquiry on Technical Education (1936-7): "No country can (industrialize) unless it has an adequate supply of men specially trained for the direction and management of large industrial concerns as well as others qualified in the minor but very important supervisory posts in them."

15. See, for example, a lecture in the **United Service Journal of India**, December 1954 and a letter in **The Times**, London, 7th February 1955.

of the telling effect of vastly superior Chinese numbers. However, they disregard the failure of the combined Chinese and North Korean armies to eject the South Korean and American forces from Korea altogether. The timely use of concentrated force has characterized all great military captains[16] but in modern war this implies adequate technical backing as was available to the Red Army in its series of offensives which began at Stalingrad and were carried as far as Berlin. A nation of Spartans would be an asset on the battlefield of today only if equipped with up-to-date weapons and backed by large numbers of competent technicians.[17] Mere numbers are no index to military strength or potential and must be considered against the background of the population, its health, education and further connected demographic aspects considered below.

LACK OF COMMON TREND

There is no underlying, deep-rooted common trend such as might be provided by race, religion, or culture in India. The organization of societies ranges from the humblest life of widely separated tribes in NEFA, Nagaland, Manipur, Tripura, the Khasi and Jantia Hills and the Mizo Hills, the Gonds, Adivasis and others, the aboriginals of the Andamans, to mention only a few, to complex ancient societies such as that of the Hindus which also came to provide the cultural basis of life as far away as Indonesia, Thailand, Cambodia and Laos. In addition, there are Western graftings racially and culturally distinct. Dermic classifications include all three main types: leuocodermi, which includes the Hemitic Arabia and Baluchi types, the Indo-Aryan. There is a similar diversity in cephalic indices. India has nurtured three major religions, has been the scene of major expansions by a fourth and shows distinct Christian influence. The proselyte creed of Islam extends throughout India, and of course is international. The strong appeal towards political and military unity endemic in Islamic preachings is an important factor in assessing internecine struggles, local antipathies and military alliances within and beyond India. Buddhism born and nurtured in India, has transplanted itself to Ceylon and further East.[18] Despite the long occupation of much of the region by various European Powers, Christianity has made very little inroads into existing religions, although there are Christian communities throughout, especially in the cities. Space does not permit mention of important but localized religions, such as Sikhism and Zoroastrianism. In common with the rest of the world today, religion

16. L. D. Hart: **The Strategy of Indirect Approach,** (Faber, London, 1954.)

17. Cf. Mountbatten, Report on S.E. Asia Command, op. cit., p. 8: "56,000 or 70,000 including civil labour ... men needed to keep a division in the field."

18. In defiance and contradiction, as it were, of all that will be said in the geographical section of this study! (Part 3).

does not dominate or control policies, but it bears indirectly in some of them. Its influence in international affairs is largely circumstantial and secondary.

National policies and international relationships are conditioned to greater or lesser degree by considerations of defence and security. In the absence of general world disarmament amongst either major or minor powers no nation relies on diplomacy alone or places implicit faith in the political ethics of its rivals. National armed forces are still regarded as essential to guarantee national independence and security — one of the original reasons for the evolution of society. It is the growing awareness of the nation to its problems of security that is considered here.

EMERGENCE OF NEW STATES

A common outlook is discernible in governmental evolution. Until the political upheaval that followed World War II, governments in SE Asia were, in the main, either colonial or monarchical autocracies. In both cases, provision for the welfare of the mass of the people was absent or inadequate. Before World War II the geographically nearest independent states with 'modern' forms of governments were South Africa and Australia. Both countries maintained then, as now, small but efficient defence forces which they expanded during the war. Pre-war colonies were the British colonies of Basutoland, Swaziland, Tanganyika, Kenya, British Somaliland, Aden and various small Indian Ocean islands such as Mauritius, the French colonies of Madagascar and certain small islands, and the Portuguese possessions of Mozambique, Timor and Goa. Independent countries whose form of government has remained virtually unchanged include Nepal, Bhutan and Sikkim; in each, however, certain tendencies towards democratization are discernible as a result of post-war political events in India and Pakistan. Thailand preserved a nominal independence while under Japanese occupation and today is closely allied, militarily as well as politically, with the United States of America. Cambodia was also a virtually independent monarchy and has recently shown tendencies similar to those of Nepal. The West Asian countries are still passing through a series of major upheavals, many of which have centred on wresting control from a monarch or a privileged class and vesting it in an elected legislature. British interests in this area were preserved mainly by treaty and nominal garrisons, as in the case of Iran and Iraq. British domination has been challenged with some success by Iran, Egypt, and others in West Asia but instability of government and political penetration by the United States of America, which is interested in this area on account of its oil resources as well as its suitability for forward air-bases for operations against the U.S.S.R., have denied the countries of West Asia the settled conditions needed for any substantial

march towards national reconstruction. Burma has severed her connexions with the British Commonwealth but has suffered badly from internal disorders since her independence. Indonesia's post-war history is similar to that of Burma. Ceylon, India and Pakistan were the first post-war additions to the British Commonwealth. The emergence of a large number of sovereign independent Afro-Asian States at the expense of imperial powers is one of the most significant events in post-war international policies.

It is the aspiration of India, and of all the countries named, to maintain national independence and retain control of domestic and international affairs of the nation, to improve the welfare and way of life of its peoples, to aid peoples not yet independent and to resist any form of imperialistic penetration. These aims have, perforce, been achieved on the whole without major military action, but the maintaining of independence of all the states as well as their effectiveness in international affairs depends increasingly on the effectiveness of their military forces.

MILITARY POWER LACUNA

Political events around India have revolved round issues of national independence in the past few years but little or no attention was focussed on the military power lacuna arising out of the termination of, in particular, British rule in India and Dutch rule in the former Netherlands East Indies and the waning of British, French and other influence in West Asia. There have been three main results of a military character. With the granting of independence to India and Pakistan, Great Britain lost her greatest source of manpower—the Indian Army. This loss precluded any intentions that Britain may or may not have had of settling by force of arms her subsequent disputes with Egypt, Jordan, Iran, and elsewhere. Where there was no alternative but to resort to arms, as in Malaysia and Kenya, the British peace-time regular army has been severely strained in its efforts to provide forces in addition to its N.A.T.O. and imperial garrison commitments. Thus, in promoting the resurgence of nationalism that is still spreading, the independence of India is as significant militarily as it is politically and psychologically. Secondly, the Dutch withdrawal from Indonesia, combined with British reductions, removed from the Indian Ocean the sizable naval forces that were stationed there before the war. Today, the Indian Navy, a small force, is nevertheless the largest naval force permanently stationed in the Indian Ocean. However, modern naval strategy with its use of carrier forces and fleet trains could result in a change in this naval balance overnight. The same applies to air power.

Complex international problems surround India. They include the *apartheid* question, various African independence and post-independence movements, various West Asian rivalries, a number of Indo-Pakistan disputes, the Malaysian wars, the Viet-Nam war, Indonesia—the Pakhtoon and East Pakistan separatist movements, not to mention the Nagas and the Mizos, to mention only some of the main ones. The general absence of concord suggests that there is a possibility of hostilities breaking out in many parts of the border. The causes of friction are quite local in character and resources too meagre for such wars to spread unless a major world power like the USA, USSR or China becomes an active participant.

THE PRIME HUMAN INTEGER

One other common feature—or the absence of it—deserves our attention. Reference has been made to the horrors of modern war and more especially its effects on the general populace. India has little or no experience of devastation on any scale.

The example of France illustrates the importance in military strategy of the assessment of both the will and the ability of a nation to fight. Unless this prime, human integer is adequate to war's demands, military might in all other spheres will avail naught. Indeed, as will be shown, and as was demonstrated by various resistance movements during World War II as well as in other wars, human will to resist and continue the fight is the most important single factor of all. Modern warfare envisages the 'continuation of policies' by other means in its most brutal aspect. Its aim is nothing less than the total subjugation of the enemy. This may be achieved by the total occupation of his territories and control of his population and industry—as was the case with Germany—or alternatively, impressing upon him the sheer futility of further resistance as was the case with Japan, by use of the first atomic bomb. The capitulations to Germany of Poland, Belgium and other small European nations are further examples. The actual, as well as psychological, totality of modern warfare is reflected in the Allied demand of total unconditional surrender demanded after the Yalta meeting during World War II.[19] The horrors to which the civil population may be subjected in war are described in the accounts of bombing of such places as Hiroshima, by an atomic bomb, and Hamburg, by conventional high explosive bombs.[20] The use of the former weapon in any future war is conjectural while, if used, there are few worth-while targets in the region; the latter, however, illustrates our point clearly enough. Hamburg is the main port of

19. See Sir W. S. Churchill, op. cit., Vol. VI.

20. See United States Strategic Bombing Survey.

Germany and at the time of the major air-raid on it by combined British and American forces its population numbered about two million. During the raid some 35,000 to 40,000 were killed and a further 40,000 were injured; a million and a quarter left the city and had to be subsequently rehabilitated. There was a fear of widespread epidemics, which did not materialize, but certainly would have if Hamburg was an Indian city. All civil defence, medical and communication arrangements broke down at the height of the raid.[21] There are many lesser examples from the last war of such devastation in England where I was present at the time. Under such stress local morale reached breaking-point although, surprisingly, national morale in England never cracked nor did panic spread far. In India we have yet to see air attacks on a comparable scale but the panic effects of a few Japanese light bombers over Calcutta and Madras in 1942 caused the authorities the gravest concern regarding the repercussions amongst the general public should a real attack or an invasion take place. The mass migrations and population movements that took place as a result of the partition of India in 1947 is a further example of what the scale of population problems might be during war in this region.

STRATEGIC MORALE PROBLEM

The strategic morale problem to be considered is: What will be the effect on morale if we are pitched against heavy odds and an enemy with more equipment than our own? This was the situation facing the U.S.S.R. when Germany attacked. This problem is faced by every country not allied to a major world power, and, even if so allied, such nations would be judicious in assuming at least temporary inferiority at the outset of any war. This problem is linked with guerilla activity and resistance movements and is further mentioned below. Thirdly, will military leadership prove adequate to the demands of war? This is an extension of the first problem posed. Turning to the civil sector, the first question to resolve is whether the civil population will continue to work and produce in the face of the very considerable weight of enemy attack that will be directed against it. Unless they do, defence production as well as morale of forces in the field will suffer. Even if the civil sector ensures 'due functioning' of the war machine and essential public utilities at the outset, what will be the effect on it of a loss of territory, severe defeats in the field and the usual crop of harrowing stories of atrocities and alarmist rumours that arise anywhere and especially amongst the ill-informed or poorly educated? Is the identification of the nation with the war sufficient for conscription and direction of labour to be applied? Do

21. Source: British Civil Defence Staff College, Sunningdale, quoting German reports and United States Strategic Bombing Survey.

the social institution and customs of our country yet permit of women working in factories and industry generally? This is the most important reserve of labour in Western countries. These are all problems that need to be assessed. Should there ever be a 4th Battle of Panipat will we collapse or go on fighting?

Assuming that morale is adequate, then requisite mental and physical standards and skills must be available in adequate quantity. Manpower shortage will soon appear in the war economies of any of the nations of the region just as surely as they arose in other countries during the last war.[22] Even with our large populations, shortages will be severe in all fields on account of poor health as well as limited technical education.

SIGNIFICANCE OF CIVIL DEFENCE

Mention has already been made of the civil defence organization, that arose in Great Britain, Germany, the United States and elsewhere during the last war, which are still in existence in those countries. The already overburdened defence budgets of India has precluded civil defence on any large scale, although Pakistan has established such an organization. The problem of civil defence in war, like that of conscription, can be related to the peace time trials and tribulations to which we in this country are subjected. Famine, floods, disease and pestilence, lack of civic sense, shortage of capital but surpluses of labour, unemployment are all problems closely related to civil defence in war. A national volunteer organization in peace on a sufficiently large scale would go a long way towards inculcating the spirit of civic discipline, social responsibility and awareness of the individual's role in national life (as well as a pool for a 'levee en masse' in war) that is indispensable to the proper functioning of the modern democratic state in peace or in war. In war this volunteer force could be transmuted into a tough, resilient and proud guerilla force ready to accept trials and tribulations. The opposite aspect to this proposal, however, is that it smacks of the German Todt organization and the mass direction of labour adopted by totalitarian regimes. However, provided Fascist indoctrination is precluded, there can be little to cavil at in nations who conscript manpower for peaceful construction purposes while their more 'advanced' counterparts in the West retain military conscription for war even in time of peace.

Economic and industrial shortcomings have been mentioned already. The industrial deficiencies of the nation suggest that in the event of war

22. See W. K. Hancock and M. M. Gowing, **British War Economy**, (H.M.S.O., 1949); M. M. Postan, **British War Production** (H.M.S.O., 1952.)

with a major power, or a more powerful neighbour, we might lose part of our territory to a militarily superior enemy. Our course of action in such an eventuality is extremely important. We have recently achieved independent status and there will be strong political motivation to defend the country in time of need. But mobilization requires time, which may be denied in border areas, as the Russian withdrawals in face of the initial German onslaught showed. Under such circumstances, the will and ability of the normal population to carry out guerilla warfare assumes the greatest importance. In the case of Yugoslavia it was their principal means of prosecuting the war and at the height of the guerilla campaign, when Germany was suffering defeats in Russia, over 20 German and Italian divisions had to be stationed in Yugoslavia merely to preserve law and order and control guerilla forces. The fall of France was redeemed more by the bitter resistance of the Maquis partisans than by anything else.[23]

RESISTANCE POTENTIAL

The key to the military evaluation of the human element in this strategic study lies in the concept of 'Resistance Potential'. In fact, our best deterrent to war today lies in the degree of Resistance Potential that an aggressor nation attributes to us. Aggrandizement by the seizure of another nation's territories and peoples had characterized political conduct in many mature countries. In the absence of powerful defence forces and being dependent, as we still are, on overseas sources, the capacity of the general population to resist and resolutely face an invader assumes the greatest importance and may make all the difference. Such a spirit of self-reliance, national pride and unswerving determination to

23. "The formation of irregulars is of tremendous importance in the eyes of the Russian General Staff. One of the lessons of the Second World War was the effectiveness of the help given to the regular armies by guerilla forces drawn from the common people; they proved their worth superbly in the Ukraine, Poland, the Balkans and France—**F. O. Miksche, War Between the Continents.** pp. 100-101 (Faber, London, 1953) ... General Eisenhower estimated ... the help given to the allied landings by the Free French Forces fof the interior equalled ... 15 divisions" — "Millions of men may start a permanent and fanatical revolution which not even the atom bomb could end"—J. Nehru quoted by F. O. Mikche, ibid.; The 1939-1945 war ... revealed the breadth and effectiveness in modern combat of a new weapon, guerilla warfare. That weapon would offer considerable advantages to a ... power which had an undeveloped industry and limitless manpower ... at war with a nation of superior technical and industrial power ... The armament of guerilla forces is relatively simple ... Guerillas can be extremely effective when ... led by men of high morale ... The ... clearance of ... guerilla infested areas ... would (require) great number of troops (and) massed operations (which) would absorb more and more men".—F. O. Miksche, op. cit., p. 147.

defend the flag is an essential attribute in any country in time of war. All political actions must make full account of its effects on Resistance Potential. An instance is the problem of accepting United States military aid. In countries of but recent sovereign status, the acceptance of such aid will be viewed as, among other things, a partial surrender to, and acceptance of imperialist penetration. Should such a sentiment prevail, a situation may well be created in which the general morale of the receiving country may become so much lower that its Resistance Potential evaporates and defeats the very aim of those providing the aid. Neither we, nor the United States should ever forget that the foundation of Communist China was the continued support of the Chiang Kai-shek regime by a powerful but misinformed China lobby.

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CHINESE TACTICS AND STRATEGY*

By Flt Lt K. R. Nambiar

FOR over two thousand years, India and China lived in peace. Down the centuries, cultural and commercial ties have flourished between these two neighbours. India displayed warmth and spontaneity in recognising the communist regime in China. She had consistently championed the cause of Red China in the counsels of the world. India and China had affirmed their abiding faith in Panch Sheela—the five principles of co-existence. Yet, one tranquil morning in early October, 1962, the slumbering Himalayas awoke to the thunder of bursting shells and the clatter of machine-guns. The Chinese avalanche was sliding down the Himalayan slopes despite the heroic resistance of the Indian defenders. Here was Panch Sheela in the reverse gear! "All political power grows out of the barrel of a gun", says Mao Tse-tung, the high-priest of Chinese communism. Indeed! a stunned world was inclined to agree.

What provoked this flare-up? Some unpardonable act of hostility by India? Flexing of muscles by the militant communist colossus basking in the sunshine of new-found strength? Or plain aggression — naked and unashamed? Only careful consideration of the demographic, economical, historical, ideological, ethnical and psychological factors underlying Chinese policy can provide the answer. This is essential not only to appreciate and evaluate the Chinese designs but also to counter them promptly and effectively.

MODUS OPERANDI

The present population of China is around 700 million. At the current rate of growth of 2.2% which incidentally is the highest in the world, China is likely to double her population in the next 25 years. Can Chinese economy withstand the strain of such a sustained rate of growth? Will the less densely populated areas of the world including neighbouring U.S.S.R. provide the outlets for this overflow? If not, Red China is heading for a demographic explosion, the like of which the world has never known. Pleas for **lebensraum,** propaganda and provocation followed by aggression — the pattern is now familiar. It is not inconceivable that the Chinese will repeat the same tactics. It is of sinister significance that despite the tremendous pressure of population the Chinese do not encourage birth-control.

* One of the entries for 1965 Gold Medal Essay Competition. The Gold Medal was not awarded for any of the essays.

Pre-war Germany, Italy and Japan stimulated rapid population growth through various means. Large funds were utilised for armament production. As the numbers swelled the leaders of these countries turned their covetous glances towards their weaker neighbours. The pleas for living-space were followed up by wanton attacks on these neighbours on some flimsy pretext or other. This was the **modus operandi** in the past and the discerning eye can easily see the familiar ingredients in the Chinese policy too.

As long as China remained weak and impoverished, her neighbours were safe. But China today has a strong central government, fanatic, aggressive, confident and well-versed in the mechanisms of subversion and war. The basic situation vis-a-vis Chinese population explosion and her neighbours will remain unchanged regardless of the type of government in control of China. But, with a communist government in the saddle the situation is even more perilous, as we shall see presently.

Communism is an expansionist creed which is both 'national' and 'international' in character. Communism thrives on poverty and squalor and the semi-starving millions of Asia can be an easy prey to it. All these communist parties in various countries, despite their vehement protestations to the contrary, owe ideological allegiance to international communism. Though the Sino-Soviet rift has complicated the situation, there are large groups of Peking-oriented communists in all Asian countries including India. Here then is a powerful ally which the aggressors of the past lacked, the fanatical proselytising zeal of thousands who are willing to be tools in the cause of Chinese expansionism. The creed of communism aided and abetted by subversion is yet another motivating factor behind incipient Chinese aggression.

POTENTIAL THREAT

There are eleven million Chinese residing outside the borders of China. By some strange political logic these overseas Chinese too are included in the 'national' census of China. It matters not where they reside, but the contention probably is that they owe allegiance to mainland China. In India the Chinese population is negligible. But there is no doubt that large Chinese minorities with their submerged but substantial racial and cultural affinities with the mainland constitute a potential threat to the security of the countries where they reside. Whether or not China will claim hegemony over territories with large chunks of Chinese population is still to be seen. She has already annexed Tibet and if the past is any guide, Hitler's claim to Sudetanland is a significant pointer.

The Chinese, like elephants, have long memories. They have not forgotten the indignities they suffered at the hands of Western imperialists.

To quote Mao, "The imperialists have taken away many Chinese dependant states and part of her territories. Japan took Korea and Taiwan..... England seized Burma, Bhutan and Hongkong.....". The recovery of these territories cannot be ruled out from the Chinese scheme of things. But when and how? Only the future can tell.

The streak of expansionism is in Chinese blood. Down the ages successive Chinese regimes have embarked on territorial aggression against their weaker neighbours. If the old trail was blazed across Tibet, Indo-China, the Himalayan borderlands and other adjoining territories, the new one is being blasted across Korea, Tibet, Ladakh and NEFA. Verily, history is repeating itself before our very eyes.

It is clear then that containment of China involves prompt and effective counter-measures embracing military, political, diplomatic, economic and psychological fields. China has a large and well-trained standing army backed by massive reserves. A formidable land power, she is probably unconquerable by direct invasion. Her air force, though large, is currently deficient in modern planes. The navy is reported to be short of powerful modern vessels. Her food production is barely sufficient to sustain the bread-line despite its upward trend. In spite of a fairly large rate of growth her heavy industries have still a long way to go. China's capacity to wage a prolonged war has to be evaluated in the light of these and other economic considerations.

It is to be remembered that her forces are well trained and indoctrinated and their morale high. The communist party has a tight grip over the Chinese armed forces. The party and armed forces leadership are inseparably interwoven, and in the higher echelons of the army heirarchy the two blend into one another. Out of the eight marshals of the army seven are members of the politburo. "The party commands the gun and the gun will never be allowed to command the party". The quotation is from Mao and the recent abolition of the rank structure from the Chinese armed forces is another step to ensure that the party will continue to command the gun.

The Chinese have a penchant for protracted warfare, their immense resources of manpower, the vastness of the country and the national traits of patience, perseverance and stoicism favouring them. It was the ancient Chinese strategist Sun Tzu who said: "Avoid the enemy when he is strong and when the enemy is not strong, stir it". The stratagem of avoiding head-on confrontation with the enemy till he is manoeuvred into an unfavourable position has been successfully and repeatedly employed by the Chinese in many a campaign of ancient and recent origin.

The Chinese believe that the shrewd have the edge over the merely strong. They are adepts at deception and surprise; they are one of the earliest to employ methods of psychological warfare.

MAO'S CHIEF TENETS

The ten commandments of warfare enunciated by Mao Tse-tung throw a flood of light on Chinese military tactics. It is interesting to note that even though their adversaries were aware of these tactics—communist tactics were often discussed threadbare at high power meetings between the Kuomintang and the Americans—Mao and his men kept on winning. The following are the chief tenets laid down by Mao Tse-tung:

(a) First strike at scattered and isolated groups of the enemy and later strike at powerful groups,

(b) First take small and middle-sized towns and cities and the broad countryside and later take big cities,

(c) The major objective is the annihilation of the enemy's fighting strength and not the holding or taking of cities and places.

(d) In every battle concentrate absolutely superior forces, double, triple, quadruple and sometimes even more to encircle the enemy on all sides with none escaping from the net,

(e) Fight no unprepared engagements, fight no engagements in which there is no assurance of victory. Strive for victory in every engagement. Be sure of the relative conditions of your forces and that of the enemy,

(f) Promote and exemplify values in combat; fear no sacrifice or fatigue or continuous action,

(g) Strive to destroy the enemy while in movement. At the same time emphasize the tactics of attacking positions, wresting strong points and bases from the enemy,

(h) With regard to assaults on cities, resolutely wrest from the enemy all strong points and cities which are weakly defended. At favourable opportunities, wrest all enemy strong points and cities defended to a medium degree and where circumstances permit. Wait until the conditions mature and then wrest all the enemy strong points and cities which are powerfully defended,

(i) Replenish by the capture of enemy arms and most of his personnel. The source of men and material is mainly at the front,

(j) Skilfully utilize the intervals between two campaigns for resting, regrouping and training. Do not let the enemy have breathing space as far as possible.

It is needless to state that these tactics have been highly successful in many battlefronts.

At times the Chinese employ "the human sea strategy" which consists of wave attacks in which overwhelming numbers are thrown in with reckless abandon to achieve a break-through or complete destruction of

the opposing forces. Several such attacks were mounted against the Indian defenders during the Himalayan campaign. The following revealing dictum of Mao Tse-tung sums up the Chinese tactics ably and aptly :

When the enemy comes forward, I withdraw
When the enemy withdraws, I go forward
When the enemy settles down, I disturb him
When the enemy is exhausted, I fight him.

To be forewarned is forearmed and never more so than against the Chinese.

THE NEED FOR CONSTANT EFFORTS

What is the effective answer by India to the military might of China, both conventional and atomic? Vast human resources and a large territory are our assets too. Do we possess the required economic strength? We are currently engaged in ambitious economic planning to redeem the lot of the overwhelming majority precariously perched on or near the bread-line. Any attempt to gear the national economy to adequate military preparedness has to reckon with this overriding consideration which implies that a limit on qualitative expansion of the armed forces is set by the resources available without drastic reduction in development expenditure. On the quantitative front, constant efforts are required to keep our military machine up-to-date and effective.

The Himalayas are undoubtedly our first line of defence and the paramount need for adequate number of troops suitably trained and equipped for mountain and snow warfare is self-evident. There is need for a well laid-out communication system. Road communications are being rapidly developed. But, in the field of telecommunication there is room for expansion. The importance of communication lines in modern warfare needs no emphasis. But, nowhere is this more dramatically highlighted than in the rugged wilderness of the Himalayas. One of the effective means of communication in this type of terrain is provided by microwave links augmented by tropospheric scatter propagation networks.

The need to augment the air force with large numbers of front line fighter, helicopters and transport planes, needs no reiteration. There is equal need to expand the navy, particularly its submarine and anti-submarine arms. In any conflict with China, one has to reckon with the threat from their submarines operating in the Bay of Bengal and the Arabian Sea. Adequate Indian naval strength alone can underwrite our maritime security and there is need to develop naval and air-bases in the Bay of Bengal.

Good weapons, no less than good troops win battles. Most modern weapons are costly, complicated and sophisticated. Though effectiveness is still the primary yard-stick, such factors as availability of spares, cost, versatility etc. govern their choice. Only a body of independent experts can pass a balanced judgment on the suitability or otherwise of a sophisticated weapon. Perhaps, a department of weapon research and development under the Ministry of Defence can effectively tackle this job. Individual opinions still play a decisive role in these matters.

There is need for a thorough study of Chinese tactics and strategy. From Sun Tzu to Mao, a long line of military pundits have laid down the law in the conduct of military affairs. Only some of their works have been translated into English and other Western languages. There is also scope for vast improvement in our intelligence system. The importance of accurate intelligence in offence as well as defence needs no elaboration. There is also need for an integrated border defence force acting in close co-operation with the army with the appropriate machinery for liaison.

Integrated military planning and co-ordination between the three services are vital for our security. The three Chiefs of Staff are normally preoccupied with matters of their individual purviews, leaving them with neither the time nor the opportunity to deliberate on general planning. The need for a Chief of Defence Staff to co-ordinate the activities of the three services with the added responsibilities of military planner and adviser to the Government is being increasingly felt.

NUCLEAR THREAT

The potential nuclear threat posed by the Chinese is an urgent new factor in our defence thinking. Should India too manufacture N-weapons? Undeniably, we have the potential to make them. Apart from the military aspect, this involves political and economic factors of far-reaching consequences, making the choice both delicate and difficult. India's declared policy is to abjure the use of N-weapons. This is not merely an altruistic decision on moral grounds, but has also compelling reasons of economy and expediency behind it. It is true that the cost of manufacturing N-weapons is staggering. But it is equally true that the Chinese are likely to acquire sophisticated N-weapons along with their delivery systems in the next four or five years. Even after conceding that the value of N-weapons is mainly political and psychological it is difficult to visualise how the Chinese threat can be effectively countered without a nuclear deterrent of our own unless the super N-powers are willing to guarantee our nuclear defence. As yet, there is no indication of this.

TWO ASPECTS OF SECURITY

Building up adequate military might is only one aspect of our security. The political and economic aspects of security are of equal, if not greater, significance. In fact, national security needs co-ordination of all these three aspects in their short- and long-term applications. In any confrontation with China, our internal stability, political as well as economical, will be one of the decisive factors. Pledged as we are to the democratic way of life, we want to shape our destiny without totalitarian restrictions. A democratic society can flourish only on the edifice of essential ingredients of public life such as co-operation, incorruptibility, vigilance and discipline. A successful democracy is a happy blend of duties and privileges, an amalgam of give and take. In democracy individual freedom is inviolable. But, misuse of this precious right can also cause the downfall of democracy by sowing the insidious seeds of disruption, corruption and decay. "A family must destroy itself before others can destroy it. A kingdom must first smite itself before others can smite it", thus wrote Confucius.

SUBVERSIVE ELEMENTS

It cannot be denied that there is considerable danger to this country from subversive elements. In the struggle for peoples' minds communism has a few overwhelming advantages. It is a new and dynamic creed promising plenty to the "have-nots". It matters little if the promises are empty, if the means are subservient to the end; it matters even less if the promised utopia turns out to be a cheerless society of regimented monotony. Communism will continue to appeal to the needy and the gullible. How then are we to counter subversion? A vigilant watch is to be kept on the subversive factions, and their nefarious activities nipped in the bud. They deserve no mercy, for they know no compassion. This is only a negative and punitive measure. What is required are urgent and dynamic moves to establish an egalitarian democracy strong enough to combat the high pressure tactics of aggressive communism. In short, we have to deliver the goods. This would entail radical improvement in public morality and above all, dedication to hard work in all spheres of creative endeavour.

THE FIRST LINE SECURITY

If war is an extension of diplomacy by different means, diplomacy undoubtedly is the first line of security. There are several developments unfolding in Asia with profound influence on the Asian situation in general and the Sino-Indian relationship in particular. The Sino-Soviet

rift, the Vietnam inbroglio and the emergence of an economically virile Japan are some such vital factors. The U.S.A., Britain and Australia also have vital stakes in this area. Diplomacy is dictated primarily and predominantly by enlightened self-interest though political, economic, religious and ideological overtones also may be present. There are certain important factors underlying the Asian political situation, which, if deftly handled, can tip the diplomatic balance in India's favour.

The major factor is that the two super powers, for their own reasons, cannot watch from the sidelines any violent shift in the balance of power in this vital area with any degree of equanimity. Another important factor is the Sino-Soviet rift. Though it is doubtful whether the U.S.S.R. will snap her ties with China as long as East-West differences are unresolved, there are certain compelling and intriguing pressures influencing the Sino-Soviet relationship. Differences between China and the U.S.S.R. are centred round geographical, historical, economic and cultural problems essentially national in character, the ideological dispute being mainly a subterfuge to give open expression to mutual animosity. There are reports of heavy troop concentrations along the Sinkiang border and frequent friction elsewhere along the long Sino-Soviet border. In the meantime the vehement polemics continue in a torrent of vituperation. Though it may be premature and imprudent to read too much into this situation, it would be equally unwise to ignore it altogether.

Having achieved a miraculous economic recovery, Japan today stands at the cross-roads of Asian destiny, vigilant and virile. Free-enterprising Japan has little in common with totalitarian China. It is inconceivable that the U.S.A. will be called upon to undertake the defence of Japan indefinitely. The national interests of these two countries, in the long run, will make such a situation untenable. When that happens, the Japanese will have to fall back on their own resources to defend their country. Even if past antagonism between China and Japan is buried, the inescapable compulsions of geographic proximity and economic diversity will take their course. Here is a situation of interesting potentialities. Can Japan and India draw closer together, politically, economically and possibly militarily?

Australia also has compelling reasons to be vigilant about Chinese moves. Prosperous, all-White and underpopulated, Australia watches with apprehension the progress of China, unmistakably expansionist and unashamedly opportunistic. She is also aware of the delicate balance of power in Asia and its implications to her security. If India wavers, all is lost in Asia and it may well be her turn, then. How then are the two countries to combine their efforts to meet this common threat? This is for the policy-makers to ponder.

India's differences with Pakistan, and the growing affinity between China and Pakistan are also pertinent factors in this context.

ECONOMIC STABILITY

It has been stated earlier that the military might of a nation is closely allied to its economic strength which is essential not only to keep the sinews of war ticking, but also to sustain political stability and public morale. Without economic stability any war would be lost even before the first shot is fired. It is as much the men who turn the wheels of industry and commerce who contribute to victory in war as the fighting troops in the front.

There is a small but strident group which advocates much larger armed forces at the cost of development expenditure. This is a fallacious approach which deserves to be condemned. Development contributes by itself to a better and more competent military machine. Development is the lifeline of the nation and if stability and morale are to be safeguarded in the face of aggressive and competing ideology of communism it would be shortsighted and foolish to cut back on development. The example of China under the Manchus provides a shining example of such a tragedy. They bought the most expensive weapons from the West never giving a second thought to developing domestic resources of agriculture and industry. The aftermath of that disastrous policy was widespread discontent and ultimate revolution.

Emphasis has to be laid on indigenous production of weapons of war compatible with operational efficiency. The five-year defence plan which is being currently implemented is a step in the right direction. But, the pace and quantum of the overall development of the country will be equally decisive in boosting our defence. There is need to integrate defence production to fit into the wider pattern of national planning. Also there is need for urgent reforms in the field of administration and organisation. A system of administration geared to the needs of a slower moving era is no more capable of delivering the goods. Time is a vital factor in our development and unfortunately for India time is not with her, but against her.

THE WAY TO SUCCESS

The whole of Asia is in economic and political turmoil. India and China, the two most populous nations in the area, represent the two conflicting ideologies of democracy and communism and the success of one or the other will have the most profound influence over other nations in the area. We are irrevocably committed to planned progress. Though

there is certainly room for improvement, we can take legitimate pride in many of our past achievements in the sphere of planned development. There is no denying that the odds are heavy and the obstacles are formidable. There is shortage of internal resources and foreign exchange is in short supply. The rate of economic growth is not fast enough and the prices are spiralling upwards. The population growth is alarming too. But if there is no room for complacency, there is equally no room for cynicism and defeatism. It is unwise either to abandon planning or to prune development expenditure. Planning is a continuous process and if development is to keep pace with growing standards of living and the rising population, it cannot be halted or abandoned in midstream without courting disaster. The onslaught of a militant China can be checked not by military might alone, but equally by the soundness of our economy, by the unity and vitality of our people, and, above all, by abiding faith in ourselves and our chosen way of life—the democratic way.

General Taylor has this to say on the eve of his retirement as U.S. Ambassador to South Vietnam: "Success will be achieved by a combination of successful actions in the military field, political, economic and psychological". If there are still some who believe that China can be confronted and contained by military might alone, let them pause and ponder.

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AIR POWER—A STUDY IN MILITARY GEOGRAPHY

By Bikash B. Basu

MILITARY Geography is the study of military evaluation of geographical realities of a political area that are related to the formulation of its defence policies and war plans, and the conduct of combat operations. The exploitation of the air-space of a political area for the attainment of military objectives assumed great significance soon after Wright brothers succeeded in flying a heavier-than-air craft on the morning of December 17, 1903. Within fifteen years the military aircraft had clearly established the advantage in using the air-space for strategic, tactical and logistic operational missions of the First World War. By the end of the Second World War the range of military aircraft, with aerial refuelling while in flight, became unlimited; the strategic bombers carried kiloton bombs, the speed crossed the sound barrier, the height of flight reached the stratosphere; the tactical aircrafts acquired a great variety of weaponry for destruction of ground and flying targets; logistic aircrafts acquired the capacity of airlifting combat troops, tanks, artillery and a vast array of supplies; observation aircrafts were equipped with infra-red photography, radar and sophisticated electronic equipment. The progress of air power since the Second World War has been so phenomenal that instead of functioning as the third dimension of war today, air power influences the formulation of economic, political and defence policies of the nations of the world. These aspects of modern air power will be examined in detail along with the military evaluation of the geographic realities if political areas that form the basis of the functioning of air power.

AIR-SPACE AND AIR POWER

The functioning of heavier-than-air crafts on military missions in the air-space is considered to be the assigned role of air power. But with the progress of aviation and space technology in recent years, the definition of air-space of a political area has become difficult. According to the international law, formulated at the Paris Convention of 1919, a nation has complete sovereignty over the air-space above its territorial frontiers and territorial waters. Any aircraft entering the air-space of a nation, without obtaining prior permission at the political level, is violating its territorial sovereignty, and the nation has every right to take suitable military action in destroying the intruder. Till the development of jet propulsion it was easy to detect, track and destroy intruders in

the air-space. The jet aircrafts, like the U-2, flying at supersonic speed through the stratosphere at heights above 60,000-ft., can be spotted and tracked by highly sophisticated radar system, and require an equally sophisticated ground-to-air missile system to exercise an effective control over the air-space of a state. Thus the air-space cannot be limited to the ceiling of weather but has been extended beyond the stratosphere to higher atmosphere. With the development of rocketry and spacecrafts the technologically advanced countries like the USA and USSR can deploy the spacecrafts on military missions at altitudes of several hundred miles above the surface of the earth. The detection, tracking and destruction of such spacecrafts on military missions have yet to be tackled by technologists. This has activated demands for legal definition of air-space sovereignty above the atmosphere. The political and military control of the air-space of political areas can be exercised at the political level through the observation of international conventions, and at the military level through the counter-measures taken by air power. In the absence of a legal definition of air-space to control the movement of spacecrafts on military missions, political control over the air-space has become ineffective. The deployment of air power for the destruction of spacecrafts on military missions cannot be considered effective at this stage of history, though countries like the USA and USSR might achieve the goal within a measurable period.

The confusion in defining air power demands much clarification. Air power affirms the ability of a nation to deploy its aircrafts and weaponry, in the strategic, tactical, and logistic roles, to achieve the maximum advantages of mobility and firepower offered by the air-space. Some exponents of air power maintain that it should be confined to the deployment of manned aircrafts, its weaponry and infra-structure for attaining the objectives of military missions. This school of thought considers the use of unmanned rockets and missiles guided to their targets by electronic devices as merely weapons of area destruction which can be launched by the armed forces of the land, sea and air in their offensive and defensive roles. But another school of thought has been advancing the idea that the unmanned guided weapons and spacecrafts will soon replace the manned aircrafts to constitute the basic elements of air power. In strategic role the intercontinental ballistic missiles can replace the manned strategic bombers. The surface-to-air rockets and missiles can be guided to their targets to replace the manned aircrafts in their tactical roles, both in defensive and offensive operations. The satellites and missiles can also function in observation and communication roles and provide radar and televised pictures of disposition of enemy forces. Experiments are under active pursuit for developing soft-landing rockets to function in logistic roles. Thus the exponents of this school of thought concentrate their effort on establishing

the supremacy of the machine over man and maintain that the lethality of guided weapons launched through the air-space will ultimately revolutionise the concept of air power by relegating the deployment of manned aircrafts for rear-echelon movements.

The advocates of 'all-out-air-power' maintain that weapons of area destruction and mass annihilation launched through the air can effectively destroy the war potential of the adversary and lower his strength and will to continue the struggle, to enable the surface forces to occupy the enemy territory. It should be remembered, however, that the objective of war, a socio-political phenomenon, is not the destruction of the enemy territory and annihilation of enemy population, but it is the exercise of effective control over the political elite of the state to enforce a political decision. Destruction and annihilation are not the ends but the means to an end, when other means to achieve the political objective have failed to succeed.

The 'all-out-school-of-air-power' maintains that air power based on guided weapons will devastate the ground for the surface forces to take over. But the conservative school, on the other hand, maintains that air power is only the third dimension of war and its deployment in the strategic, tactical, and logistic roles is to be an integral part of the total war effort on the political, economic and military fronts. On the military front the war is to be conducted by land, sea, and air forces to achieve the war aims set by the political policy. Destruction and annihilation is to be limited to an extent that would help achieve the political aims. It is true that the infra-structure of air power, like aerodromes as well as the manned aircrafts for strategic, tactical and logistic operational roles, are more vulnerable to destruction than rocket-launching sites. Moreover, missiles launched from submerged submarines have greater operational freedom. Though anti-missile missiles have appeared on the operational scenes, diversionary action can make them partially ineffective to permit a certain percentage of missiles to go through the defence screen. This has activated the concentration of effort on guided weapons to replace the manned aircrafts. But it must be admitted that weapons, however lethal they might be, cannot change human will and determination in the field of inter-state and intra-state conflicts in every instance. The superior weapon technology of the American forces has failed to bring about a solution of the Vietnam problem. The highly sophisticated industrial economy of the advanced nations of the world, the degree of urbanisation of their demographic distribution and the high standard of living have made them very sensitive to weapons of mass annihilation and area destruction. On the other hand, the under-developed areas of the world display a hardening of conflict when faced with such weapons and resort to guerilla warfare, where man is superior to

machine, and where a military action has so far failed to achieve a political solution. The destruction of modern steel plants or electronic industrial plants can completely paralyse the war effort of a technologically advanced nation. People used to high material standards of living are most unlikely to harden their will in the face of mass annihilation and area destruction and resort to guerilla warfare. Hence, the development of missile technology, with conventional or nuclear warheads, by these countries appear to be directed to assign a deterrent role to these weapons. But the same attitude to development of offensive weapons as the basis of air power cannot be applicable to meet the military problems of under-developed regions of the world.

A study of the history of the growth of naval power will bring out the significant fact that it was admitted by the exponents of sea power that the fighting arm of the navy cannot be the sole basis of sea power, but it was intimately linked with the nation's ability to maintain a large commercial arm of the sea power, together with its economic and industrial infra-structure, the human and political interest in sustaining this unified concept of sea power. In a like manner air power cannot be confined to the nation's war making component of aviation, but the concept of air power should incorporate the total capacity of a nation to make full use of the air-space for the achievement of its national objectives in the economic, political and military spheres.

THE ELEMENTS OF AIR POWER

From the point of view of military geography the basic elements of air power are : (a) the physical realities of the political area; (b) the economic realities of the state; (c) the political realities facing a state in its international relations at a specific historical moment; (d) the human element of air power; (e) the level of aviation technology and military technology at a specific stage of history.

THE PHYSICAL ELEMENTS

The physical elements of the geographic environment of a state affecting its air power are :—

(a) **Location :**—In its strategic role the air power of a state is deployed to neutralise the infra-structure of the enemy military potential by destroying the industrial bases, the circulatory system, the operational air-fields, the economic, political and military core areas. In carrying out this role effectively the location of a state, both physical and vicinal, plays a significant part. The aircrafts on combat mission should be able to reach their targets by the shortest routes and without the necessity of overflying neighbouring States. Such overflying requires political per-

mission and in war time such a permission implies military alignment. In order to contain the Russian military colossus after the Second World War America had to take action on the political field to meet the locational handicap for the deployment of strategic air power. The politico-military alliances like NATO, CENTO and SEATO, offered her the opportunities for establishing operational air-bases nearer the enemy homeland, so that a deep penetration of the Russian air-space could be possible. Realising the ephemeral character of such alliances America also went ahead with technological and tactical research to remove the locational handicap on the deployment of her strategic air power. The development of aerial refuelling increased the range of her strategic bombers, while the phenomenal advances in missile and satellite technology have removed the limitations imposed by air-space violations of nations not involved in the envisaged conflict. Countries with oceanic location enjoy locational advantages in the deployment of their combat aircraft, whereas countries with inland location cannot fully assert their air power. In the detection, tracking and destruction of enemy aircraft and missiles the oceanic frontier also offers defence in depth. This is of vital importance in the context of nuclear technology and the highly sophisticated industrial economy and highly urbanised countries of the world. The United States and the Soviet Union, on the basis of their superior technology, can deploy their air power without locational limitations.

(b) Size:— The size of a country determines the air-space that is available for building up its air power. The military evaluation of size or the spatial extent of a state is based on the fundamental principle of maintaining an effective ratio between force and space. In the context of air power this ratio has to take into consideration the advantages offered by the air-space in the field of mobility and concentration of fire with a progressive reduction of time-space ratio. A country with a small air-space cannot build up its air power effectively because of this revolutionary change in the concept of time-space ratio in the deployment of fire on enemy positions brought about by the third dimension of war. The territorial expanse of the Soviet Union covers 1/6th of the earth's surface. The vast air-space of the Soviet Union offers her the following advantages:—

(a) to have a large commercial and powerful military components of air power; (b) to have flexibility in planning the strategic, tactical and logistic operational plans for defensive and offensive actions; (c) to decentralise the infra-structure of her air power so as to make it less vulnerable to enemy action. The infra-structure of air power includes the industrial base for aircrafts and weaponry, the logistic support, the air-bases for manned aircrafts and launching sites for guided weapons for defence and offence. A country with a small air-space, unless it is an island country like the British Isles or a country with a seaboard location like France, cannot have a sound base for air power owing to the limitations of its spatial extent. Modern air power with

its mobility at heights beyond the range of conventional anti-aircraft weapons, its weapons of mass and area destruction which maximises the principle of conception of force, makes it imperative to decentralise its infra-structure for survival. Technological advance has made it possible for countries with a seaboard location to deploy its air power from highly mobile launching bases like aircraft carriers and submarines, both for defensive and offensive operations. A country like India enjoys a large air-space but the ratio between space and force is too low to make its air power effective both in its defensive and offensive roles. This ratio has to be worked out in the context of (a) the type of war, whether global, limited or local, (b) the level of weapon technology, (c) the geographic space of theatre of operations for strategic, tactical and logistic roles, (d) the relative strength of air power of the combatants in their offensive and defensive roles, (e) the quality of training, leadership and morale, (f) the level of military aviation technology of the combatants for offensive and defensive operations, (g) the infra-structure of aviation and weapon technology of the combatants.

(c) **Terrain :**—Although the exploitation of the air-space by heavier-than-air-crafts has liberated man from its servitude to limitations imposed by elements of terrain, mountainous terrain and high altitude pose problems for tactical and logistic air operations. The low density of air, over the Ladakh region of Kashmir, reduces the load-carrying capacity of the aircrafts while operating from airfields located at elevations with about half the atmospheric pressure. While taking off from such airfields the aircrafts require a very much longer run-off. In mountainous terrain the lack of level surface poses problems for logistic support by air power to ground forces. In some areas even helicopters cannot the deployed for offering battlefield mobility, or casualty evacuation, or other elements of logistic air support, on account of absence of level ground to function as helipads. The mountainous terrain also poses problems for tactical fire support to ground forces. Tactical aircrafts have limited operational range and lack of landing grounds in mountainous terrain limits operational duration of tactical aircrafts. These limitations have activated research in aviation technology and the development of VTOL aircrafts is a pointer in this direction. In mountainous terrain air turbulence sets limitations on tactical and logistic operations. Katabatic and anabatic winds in mountainous terrain pose flying hazards. A military evaluation of the elements of terrain from the point of view of military aviation will help the working out of solutions in the tactical and technological spheres of air power. India faces the threat of Chinese aggression across the great Himalayan mountains and the operational limitations imposed by the terrain in Indian border areas for the efficient deployment of air power require serious consideration.

(d) **Weather and climate :**—In spite of the great technological advances in the field of aviation in recent years, weather still holds the upper hand in the deployment of manned aircrafts and guided weapons through the air-space for effective establishment

of command of the air. Whether it is in the tactical, logistic and strategic roles, the operational plans of the air force are conditioned by the prevailing weather, not only over the operational base area, but also over the target area. It is true that the supersonic jet aircrafts in their strategic role can fly above weather and send down rockets, missiles or bombs over the target area guided by electronic devices, which constitute the advantages of air power of countries like the USSR and USA. In recent years flying hazards have been detected even for jets in the stratosphere, owing to the eddy currents along the 'jet-streams' at elevations between 35,000 and 55,000 ft. Tactical and logistic missions, which are essential for most offensive and defensive operations cannot be confined to the stratosphere. Hence, weather is bound to affect the operational efficiency of air power. The electronic communication and guidance systems operating between the air-base and the manned aircraft, or between the launching-site and the missile in flight, on operational missions are susceptible to attenuation in bad weather. The aircraft is also subject to structural strain while flying through turbulent weather. In order to increase the range, the speed and the load-carrying capacity of the aircrafts the weight of the structure is reduced to the minimum. This exposes the aircraft to structural damage in turbulent weather. During the monsoon over India and during the pre-monsoon and post-monsoon thunderstorms flying activities are seriously affected due to the turbulent weather conditions. Radar technology and the electronic guidance system have removed certain limitations on operational efficiency imposed by weather, like lowering of visibility due to fogs, clouds and atmospheric impurities. High winds not only affect the manned aircrafts but they also affect the missiles in their flight to the targets. A military evaluation of the weather and climate of possible theatres of operations of a political area from the point of view of effective deployment of air power will bring out the types of limitations imposed by this geographic reality of a state. This knowledge will activate research and development in the field of aviation technology and tactical concepts.

THE ECONOMIC ELEMENTS

The economic elements of the geographic environment of a state affecting its air power are :—

(a) **Raw materials and Fuels** :—The aviation industry requires a very large variety of raw material resources, especially in the field of light metals and high speed alloys. The designer of the aircraft has to keep the weight at the minimum level, without affecting its structural quality, in order to enable it to carry the maximum load of engines, quantum of fuel, weaponry, equipment and personnel. The increasing speed of the aircraft has introduced the problem of frictional heat, demanding special heat-resisting metals and advanced concepts of streamlined designs. A very few countries can claim even a reasonable degree

of self-sufficiency in metallic resources to sustain the modern aviation industry. The availability of aviation fuel in adequate quantities and its assured supplies in time of war constitute an important element of air power. Apart from the USSR and USA, the major powers in world politics have no domestic sources of aviation fuel. The dependence on the USSR and USA for aviation fuel has introduced limitations on freedom of action on the political and military fronts for the member states of the bi-polar power blocks. With the deterioration in Sino-Soviet relations, the flow of aviation fuel from the USSR to China very nearly dried up and this became a serious handicap to the operational efficiency of Chinese air power. The political and military tension in the West Asian region is primarily due to the conflict of interest of the major powers in world politics in acquiring and maintaining control over the exploitation of the richest oil-bearing area of the world. These limitations imposed on air power by the availability of aviation fuel have led to a vigorous search for new sources of oil. It has also initiated scientific research in the field of substitute fuel for aircraft, particularly in the field of solid fuels and chemical fuels. It has also forced political action to secure control over the flow of oil through subversive and overt action. During the Second World War the overthrow of the Rumanian Government and its replacement by a pro-Nazi regime and the bombing of the Ploesti oilfields by British bombers are pointers in this direction.

(b) **Industrial potential**:—The aviation industry requires a highly sophisticated industrial base, in the context of the trend of modern aviation technology. India has started her aircraft industry, but lacking an adequate industrial base, she is still dependent on other countries for a large quantum of components. The industrial base for air power should be able to design and produce airframes, aircraft engines, instruments, weaponry, as well as the requirements of its infra-structure. The industrial base should also be able to keep abreast with the technological advances in military aviation. The industrial base has to meet the requirements of the detection, tracking and destruction instruments or weaponry of the modern military element of air power. Even advanced countries, like the United Kingdom and France, have found it necessary to give up independent efforts to modernise their military and civil aviation needs and launched a cooperative endeavour. But developing countries, like India, depend on imported aircrafts and equipment to meet the requirements of civil aviation as well as that of the air force. The collaboration with technologically advanced countries forms the basis of the building up of the industrial base of air power. This remains a serious handicap in pursuing an independent policy with regard to the development and deployment of air power.

(c) **The circulatory system and electronic communications** form two important elements of air power. The phenomenal progress made in the field of electronics since the Second World War has

brought about revolutionary changes in the strategic, tactical and logistic doctrines for offensive as well as defensive deployment of air power. The emergence of guided weapons, surface-to-air, air-to-air, and air-to-ground, depending largely on electronic instruments, have been responsible for maximising the principle of concentration of force exploiting the air-space to attain the principle of mobility. A study of military history discloses that supremacy of concentration of force led to tactical and technological research in the field of mobility. The dominance of mobility led to tactical and technological research in achieving more effective concentration of force. But modern air power has resolved this struggle between two fundamental principles of war, primarily by exploiting the air-space and secondarily with the development of electronics. The lack of advanced electronic industry constitutes a serious drawback in the efficient functioning of air power.

(d) **Socio-economic advancement, internal and global aerial commercial intercourse** have vital impact on the growth of aeronautical framework on which the basic elements of air power so much depend. Commercial aviation of a country is based on the ability of the consumer to pay higher premium on reduction of time-space ratio ignoring the competitive price offered by surface transport. It also rests on the consumer demand for types of goods and services which can be met only by commercial aviation. Commercial aviation, its technological, industrial and economic basis are of vital significance to the development of air power.

THE POLITICAL REALITIES

The political realities facing a state in its international relations at a specific historical moment affecting its air power :—International relations can be viewed from the vicinal and global aspects. India's vicinal relations with China and Pakistan are posing security problems at the moment. After the Chinese communist take-over of political power, China acquired a large fleet of military aircraft from the Soviet Union and set up its production capacity of jet aircraft with Soviet assistance. She also set out to develop her nuclear potential and rocket and missile technology with technical aid from Russia. In spite of the withdrawal of the Russian aid in these spheres after the Sino-Soviet ideological dispute shook the communist world, China has marched ahead in building up her air power, rocketry and nuclear weaponry. But China will take some more years to make these operationally effective. The shortage of aviation fuel and lack of advanced types of tactical and strategic military aircrafts constitute two major handicaps of Chinese air power. These facts have to be considered in the context of India's political relations with China in evaluating her air power development. It should also influence the line of action on the political front based on the relative

strength of air power. Considering the large air-space that has to be defended along the Indo-Chinese frontiers and the mountainous terrain where tactical and logistic support to the ground forces has to be provided against vastly superior Chinese air and ground forces, India has to seek a political solution of the Indo-Chinese conflict backed up by an effective air power. In the context of global international relations India follows a non-aligned policy of positive neutralism. India is also an active advocate of banning the use of nuclear weapons. But this "attack on weapons of war rather than on war itself" has so far failed to prevent the proliferation of nuclear weapon development. Today, there is a trend towards poly-centric nuclear weapon technological development along with its delivery system of missile technology. These weapons are aimed at mass annihilation and area destruction and as such they have acquired a deterrent role. The global powers have shifted their basis of international political relations from being based on the "Balance of Power" concept to the "Balance of Terror" concept. With the emergence of poly-centricism of 'deterrence' and the increasing perfection of detection, tracking and destruction of deterrent weapons by anti-missile weapons, there is a new trend towards basing international relations on the "balance of discretion" among the global powers. This shift in international politico-military relations has increased the significance of conventional air power as the third dimension of war. For global powers like the United States and the USSR, with a sound geographic, economic and technological base, the role of air power seems to be confined to tactical and logistic support to land and naval forces, while the strategic role of air power is generally assigned to the missile, rocketry, satellite and nuclear weapon technology.

In this bi-polar global power-political period of human history the domination of the Arctic air-space has become of vital significance. The Arctic air-space can be termed the "Pivot area of global strategy". The flight of aircrafts and missiles between the USA and the USSR will be across the Arctic air-space to follow the great circle route. The domination of the Arctic air-space by any global air power will endow it with the advantages of early detection, tracking and destruction of nuclear weapons in flight, long before they reach their target areas. In order to bypass this pivot area of global strategy, technological progress in the field of launching nuclear weapons from submarines while submerged has achieved significant success. To meet this threat aircrafts, equipped with detecting and destruction devices, are being developed.

The British Prime Minister, Baldwin, remarked on July 24, 1924, "It is easy to say, as many people do, that England should isolate herself from Europe, but we have to remember that the history of our insularity has ended, because with the advent of the airplane we are no

longer an island". In this air age no nation has any geographical barrier along its national frontiers to prevent the entry of the enemy through its air-space to carry out its military mission. Hence, air power has forced the military and political elite to reorient their strategic concepts in the political and military spheres. Some nations, like the United Kingdom, are extremely conscious of the defence of their air-space in view of the following realities: (a) the highly urbanised character of the population, resulting in concentration of the population in specific areas, is most vulnerable to air attacks; (b) the high level of industrial development and its sophisticated technology makes its economy more vulnerable to air attacks. The same is true of many other countries, like France, West Germany and Sweden. There are evidences to show that all these countries are going ahead with 'deterrent' weapons and maintaining their air power at the highest level. But global powers, like the United States, use air power as an instrument of their global political policies, since air power has endowed them with strategic mobility of ground forces at short notice, tactical and logistic support to the naval and ground forces at any point on the globe, as well as concentration of fire power over the target area with the minimum effort. Thus air power has become a political weapon in international relations for global powers to browbeat countries without a matching air power.

THE HUMAN ELEMENTS OF AIR POWER

For military evaluation of the air power of political areas the human elements of air power are equally significant. Air power rests on a very high level of technological man-power, which depends on the general educational level of the country. For the construction, maintenance, and operation of air fleets, their infra-structure and weaponry, a large sector of the technically educated youths provide the manpower, whose training, morale, intelligence and capabilities of conducting research in aviation technology are of vital significance. The leadership of air power should be able to constantly review the doctrines of tactics, strategy and logistics in the context of continued progress in metallurgy, physics, automotive engineering, aerial photography, electronic communications, automatic and guided weapons, the detection, tracking and destruction of aircrafts, missiles and aviation infra-structure, and the entire complex of scientific and industrial research and techniques. Just as the ability of a nation to divert an adequate amount of its GNP to the maintenance of its armed forces depends on its economic strength, similarly, the ability of a nation to divert a large proportion of technically qualified youths for the maintenance of its air power depends on the general educational level of the country. A developing country like India, with a percentage of literacy around 25% of which the technically qualified youths are in

high demand in the different sectors of the economy, cannot have a sound basis for air power. Unless the educational programme of a country is science and technical oriented, as it is in the USSR and the other technically advanced countries of the world, the air power cannot be based on sound foundations.

THE LEVEL OF AVIATION AND MILITARY TECHNOLOGY

The level of aviation technology and military technology at a specific stage of history as elements of air power :—During the last fifty years aviation technology has made such rapid progress that it has initiated revolutionary changes in military technology. In aviation technology the progress in the field of speed, range and height of military aircraft has been so rapid that the principles of war have undergone constant re-evaluation. The principles of mobility and concentration of force were considered to be contradictory elements of principles of war till the arrival of air power. Today, the exponents of air power maintain that the principles of offensive and economy of force can be achieved effectively only by the exploitation of the air-space, whereas prior to the emergence of air power the principle of offensive could only be applied by maintaining a 4-to-1 ratio over the enemy forces.

The aviation technology of a nation has to keep in mind the functional specialization, operational quality and the quantity of aircrafts to maintain the effective ratio of force to space in the context of opposing forces. The military technology of air power in the field of weaponry, communications and electronics, has also undergone revolutionary progress. Guided weapons of mass annihilation and area destructions, like the missiles and rockets, are considered the offsprings of heavier-than-air crafts. Aerial photography, radar and electronic communications have endowed the defence forces with the ability to detect, track and destroy enemy forces without being hindered by geographical elements of terrain, distance, visibility and mobility. The deployment of air power in co-ordination with land and naval forces has made the concept of 'total war' a reality. Air power alone can reach targets beyond the reach of land and naval forces, thereby achieving the aims of total war.

An appreciation of the role of aviation technology and military technology at a specific stage of history is of vital significance to an understanding of the military evaluation of geographic realities of a political area for a sound basis of air power. In the First World War military aviation appeared on the scene of war as a subordinate and support element of land and naval forces. In the Second World War technological advances established for military aviation an independent

status after it had acquired distinctive success in its strategic, tactical and logistic roles. Today, the offspring of heavier-than-air craft, the guided missile, is being developed to replace the manned aircraft in the strategic, tactical and logistic roles. But the missiles have yet to reach the standard of accuracy which manned strategic and tactical aircrafts can achieve. The role of manned aircrafts in carrying out observation, reconnaissance, providing smoke screen and lighting up of targets in battle area, are being taken up by space technologists to be performed by unmanned crafts. The perfection of soft-landing of space-crafts will ultimately introduce guided missiles in their logistic roles. The televised pictures of earth's surface sent by unmanned space-crafts are so detailed that different models of automobiles parked on streets can be identified. The present attempt at sending up an artificial sun is aimed at lighting up targets in the battle area. The communication space-crafts can transmit intelligence information from one part of the globe to another within a short time to enable proper military action to be initiated before the situation goes out of control. All these technological changes will require a re-evaluation of the military evaluation of the geographical realities of a political area from the point of view of air power.

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TRAINING FOR WAR

By Major K. Brahma Singh

INTRODUCTION

With neighbours such as we have, we too like them shall have to accept the principle of inevitability of war, be it as a necessary evil. For, it takes only one to wage a war. We must therefore keep training hard for war, however peaceful the political atmosphere may appear. Political speculations, specially where they aim at ruling out possibilities of war, greatly injure sincere and hard training. No country has been caught napping twice and we do not wish to create such history.

With the war lurking round the corner thus, our training should be knitted round the great aim—preparedness for war. There is now no room for eyewash. The unit commanders themselves are the best judges as to the state of training of their units. Their entire effort should therefore be to satisfy their own conscience rather than worry about higher commanders. In most cases it is easier to satisfy an inspecting officer who cannot see everything. The temptation to follow the easier course must be checked and, if need be, personal gains sacrificed for the good of the Army and consequently the country.

SANCTITY OF TRAINING

IN the absence of the greatest influencing factor — the enemy — during training accurate assessment of the state of preparedness for war and the proficiency of commanders on the basis of results achieved during training, is not possible. Again, in the absence of the actual war conditions some results can be forged too. This is more so in the case of Infantry or perhaps the Armoured corps than other arms. It is easier to forge tactical proficiency than technical. As a general rule, however, the only test of training is the war. With no possibilities of a war breaking out at all; then, if at all it does, there being no guarantee that he will have to command the same troops that he is training; and, greatest of all, there being no acid test of training during peace he is tempted and cheated to follow the easier course of forging results either merely to avoid hard work or as a short cut to promotion. To avoid this an air of sanctity needs to be given to our training very like the religious sanctity that has been given to universally accepted good *karmas* that may not outwardly yield material fruit to the doer. Personal ambition should come into play only after one has worked conscientiously with the sole aim of preparedness for war as a matter of sacred duty. The high ambition of doing one's duty can prove to be sufficient motivation for work.

THE PROBLEM

It is not only the will that is needed to carry out effective training. There are numerous and puzzling hurdles that come in the way of training that require ingenuity of thought for overcoming them. The ideal conditions under which clock-like training is conducted in the various schools of instruction, never prevail in units. Guard duties, workings, unit employment, the limited quota of leave, inspections and the like are chronic problems facing training in a unit. To add to all these, units in certain areas face further obstructions to training in the shape of operational commitments and maintenance problems such as road repairs, store lifting, airfield workings, shelter construction and repairs and water-carrying duties. Every regimental soldier will bear it out that these are only to name a few and there are many other unforeseen types of obstructions which completely upset training plans. All these tasks and duties tie down manpower, limit the time available for training and cause interruptions in the training of an individual. The great problem, therefore, is as to how to put all the men through the training and what all to teach them in the limited time available. The complexity of the problem is an indication for flexibility of action and not an excuse for inactivity. Failure to cope with the problem will invariably cause frustration.

MEANS AND ENDS

As in the case of all work, before we get down to training we must make a clear distinction between the means and the ends. Mixing up of the two whereby we may start glorifying the means and completely forgetting the ends may well result in utter waste of effort and time. Simple as it may appear, quite a number of us are likely to get entangled in the means and completely loose sight of the ends. That is the reason why, whereas at higher level the formation of the training directive has assumed greater importance than the execution of it, at lower level the instructor is more worried about the class management than the intake by the students. Means are to take us towards our goal at the earliest. Those that do not fulfil this task must be discarded, however impressive they may appear outwardly rather than shift the goal on their account. A football player may be able to thrill the spectators through magnificent dribbling and earn cheap laurels for himself but he is no good to the team unless he scores or helps to score a goal.

TWO-YEAR TRAINING CYCLE

The two-year training cycle seems to be the only solution. Much had been said on the subject in the past. Its greatest advantage is that of thoroughness achieved through greater time allotment. A thoroughness that will stand a soldier in good stead not only for two years before his turn comes again for revision but may be for life. The

only drawback it suffers from is the less spectacular output per year in terms of quantity. Or perhaps the disadvantage that training having got spread over such a long period, in case of an emergent requirement of troops for action at that particular moment they may not be very proficient in those aspects of training which might have been scheduled for the next year. Without getting any further involved in the argument it may be said that even if the two-year training cycle is not accepted for all the trained soldiers, it must be carried out once with a young soldier for giving him a sound grounding in training which his short stay at the training centre cannot give him. Once he is up on his feet he can be put through the yearly cycles as a matter of revision.

TRAINING DIRECTIVES

In view of the great hurdles facing training (some of which are necessary evils that cannot be done away with) ambition in our training directives will have to be curbed to the point of practicability. Where impractical ambitions are dictated by training directives from higher headquarters, it is the moral duty of the unit commanders to point out this to their higher commanders. Where the unit commander fails to put up the true circumstances, he thereby deprives the higher commander of the vital data required for assessing and policy-making. The sole responsibility of the training turning into a farce would in that case lie on the unit commander himself.

Although the putting forward of difficulties is the responsibility of the unit commanders, it would do well for higher commanders to encourage them to come out with their problems. For, which commander does not wish that this directive is carried out in fact? The training conferences are too short and formal to solve the multifarious problems of a unit. They are more of a senior's assertions as to what he would like to be done. Individual attention is required for their solution. Special inspection, visits with the sole purpose of listening to their subordinates would put them in a better picture as to the state of training of units under their command. Many problems will automatically be solved if the training directives from higher headquarters give greater latitude of action to the unit commanders in the conducting of their training. A flexible training directive based on a thorough knowledge of the difficulties of the units required to implement it, though less ambitious, will be of greater guidance and instructive value than an over-ambitious one made impressive by a choice of thundering words. The practical training directive would not only be a guarantee for implementation but also counteract the danger of our living in a fool's paradise through paper achievements.

The other requirement of the training directive for it to be taken really seriously by the units/sub-units required to implement it, would

be for it to contain only a selected list of the various aspects of training that a commander would like to stress during the training period. Religious reproduction of all that is contained in the pamphlets in garb of points that are to be stressed during training ruins the effectiveness of a training directive. The same goes for the enumeration of standards to be achieved. Here again the training directive has to be more specific as to what standards are required to be achieved rather than a general leaning on the pamphlets.

During formulation of a training instruction at a lower level carrying down of a generalisation of a higher headquarter training directive must be checked for it to be of some use to the sub-unit commander. When a commander finds himself in a vicious circle where each rank blames its higher rank for eyewash and forces his lower rank to follow the same, his task of producing a practical training directive may become difficult. Under such circumstances even preparation of two training directives like the double account books of tax evaders is advocated, rather than allowing insincerity to set in. Loyalty to training is now more important than any other loyalty.

INDIVIDUAL TRAINING

Cadre System

The main hurdle of non-availability of troops for training can be overcome by organising individual training in a number of short cadres instead of the normal continued programme for the whole of the individual training period. This will enable troops to carry out training (maybe bare essential only) and also perform duties by rotation. By reducing interruptions in an individuals training thus the much-wanted thoroughness is also achieved in this way. The cadre system will also solve the problem of non-availability of NCC instructors besides facilitating the squading of the classes by service groups. The inherent drawback of the cadre system in that it does not give an opportunity to the sub-unit commanders to train their command is quite appreciated but, as it is, how far is it possible for sub-unit commanders to be present with their sub-units during the training period which continues all the year round. Wherever possible the opportunity to commanders to train their own men should be given even in the cadre system.

The Syllabus

The syllabus for the cadre will of course depend on the duration of the cadre but the general requirement being the conducting of a larger number of cadres, the cadres will have to be short and the syllabus slashed to the bare essential. This bare essential syllabus should include maximum of practical handling. It would also be a waste to teach a

trained or even a young soldier through stages. It would do well to illuminate basic lessons or combine many into one to be able to devote more time to key lessons.

Flexibility

Flexibility to ensure that no individual misses any period due to unforeseen duties, can be achieved by so arranging the revision periods in the cadre that each day's programme is repeated the next day. Further flexibility could be given to the programme by keeping a large number of spare periods proportionate to the prevailing uncertainty in planning.

COLLECTIVE TRAINING

During collective training we must guard against the drawback of generalisations. With live enemy around us there is no reason why we should still indulge in generalisations and exercise in the various operations of war in a mechanical manner. All collective training should now be carried out on the basis of our actual operational commitments. This is more so applicable to the training of those troops that are poised near the border to take on the enemy. This time of the lull should be utilised in a thorough study of the ground on which we may have to operate, the likely courses of the enemy and a rehearsal of our own actions and reactions. Training conducted thus will show up problems of administration, wireless communications, infiltration, and encirclements, in their correct magnitude for which answers will have to be found per force.

The aim of our collective training in general should be to develop in our unit/sub-unit commanders the 'art' of war which will pay greater dividends as a substitute for material and equipment where we may not be able to compete with our enemy. The setting of exercises should allow for greater freedom of action to unit/sub-unit commanders. The necessary fog of war should be created for developing initiative cunningness and quick reaction among leaders. The 'enemy' should be made more live by springing surprises after our plans have been made. Slipshod exercises can be most frustrating for the troops even though they may bear it quietly.

Battle Intelligence

Fighting without information regarding the enemy amounts to fighting blindfolded. The enemy naturally strives hard to deny intelligence about himself. The task of acquisition of information in war therefore is very difficult one and needs much training. In our collective training exercises, therefore, the tendency to provide such information on the platter must be checked even if the exercise gets prolonged on that ac-

count. That is how things are going to happen in war and this type of training will wash away the set ideas in commanders of "quick attacks" in specified limits of time.

Acquisition of information is a laborious and time-consuming job and the process must be accorded the status of an operation of war. It not only involves mere observation of the enemy but thoroughly planned patrols, raids, outflanking moves, cunning devices for making the enemy open up, and maybe, faint attacks. All this needs to be practised during collective training exercises. Two-sided exercises would be ideal for this type of training.

SAFETY PRECAUTIONS

We must correctly understand the relationship between safety precautions and training. More the safety precautions are cared for the less is the effectiveness of training. The less effective the training the lower will be the standard of training and greater the need for safety precautions. A chain reaction is thus set up dragging the training standards to lower and lower depths of deterioration. It is not intended here to advocate carelessness, nor to condemn all safety precautions being taken at present. Our social structure being such, we shall have to take some safety precautions despite their ill effects. The aim here is only to decry over safety whereby an attempt is made to eliminate even the zero per cent chances of an accident. Over-safety is either a result of ignorance whereby one feels that anything can happen or moral cowardice at the thought of having to answer in case of a mishap. All this will go when we realise the immense responsibilities on our shoulders as regards preparations for the war.

SUPERVISION

It goes without saying that training cannot run by itself without supervision. Also that supervision has to be effective and essentially that of an officer to ensure correct execution of policy and uniformity in standards. This is what the task of an officer is during peace and no excuse can be great enough to take him off this job. The neglect of this aspect of training is attributed mainly to the non-availability of officers and excessive paper work. Both these difficulties are genuine but are no excuse for inaction. The problem of non-availability of officers could be solved by pooling all officers for training into a training team headed by the unit 2IC. Adjutant whose important job is supervision and control cadres could be relieved of quite some paper work either by giving more responsibility to the head-clerk in routine matters or handing over such matters to the intelligence officer. As a matter of fact where an officer

is required most is the briefing period and this much time every one should be able to spare.

OFFICERS TRAINING

Regimental duties occupy an officer so much that he can devote very little time for his own training. Shortage of senior officers also makes the young officers training in the unit difficult. The old timers that were clinging to the idea of YOs being trained by senior JCO have also now relaxed slightly. Courses are the only way of training an officer. Unfortunately there seems to be a feeling in certain quarters that courses are only meant to fit the officers in the various unit appointments. Any courses beyond this aim are considered as of personal benefit to the officers. A well-qualified officer is not only a good officer but is accepted as such by his subordinates and good officers make a good battalion. The tendency to do only such courses as are necessary for promotion must also be checked.

Sending of officers for courses to countries like Japan, Korea, Malaysia and Indo-China would probably be more profitable (however unpleasant it may look) for a country like ours than sending them to Europe.

CONCLUSION

Political speculations ruling out the possibility of war are the greatest enemy of hard and sincere training. The sentinal cannot afford to be caught down guard, for on his shoulders lies the heavy burden of keeping the tricolour aloft. His training therefore forms part of his religion and must be accorded the same sanctity to fight against the temptation to cheat.

It is not only the great will that is required to carry out effective training but also a struggle against numerous problems through flexibility of action and thought on the part of the planners. Syllabus has to be related to time available so that thoroughness of the bare essential is not sacrificed for the sake of impressive paper achievements. Training has also to be related to our enemy, the ground, likely operations and our state of material preparedness. Crushing defeat next time for the enemy we have just defeated and vengeance against the one that got away in '62 should be the motto of every Indian soldier while he is preparing for the inevitable war.

EMPLOYMENT OF ARMOUR—SOME ASPECTS

By Brigadier Sheodan Singh, MC

GENERAL

Rather than stake the lofty claim that armour forms the backbone of a conventional army, it would be safer to say that it plays a vital role in land battles in which the terrain permits it to develop its full power. Armoured forces, if used with imagination, skill and boldness, can cripple the enemy's offensive potential and reduce his will to fight as well as his defensive capacity for subsequent operations. The effectiveness of armour can be decisive if it is launched into battle with balanced strategic judgment and used in the battlefield by junior leaders with tactical skill and technical precision. The writer would like to discuss some important aspects of the effective use of this arm which are sometimes overlooked.

ARMOUR—A STRATEGIC WEAPON

THE employment of armour in its traditional mobile role in a sector of the theatre of operations where it is likely to produce decisive results is a strategic concept. How and where the armoured forces are to be employed forms part of the overall tactical design of the theatre commander. The judgment based on facts gathered through intelligence sources regarding the terrain, the enemy's intentions and his strength has perforce to be accurate when the launching of this vital arm in battle is envisaged.

What should the theatre commanders aim to achieve by means of this arm? Without going into a detailed discussion on this point, it can be safely assumed that the main aim should be to deliver the enemy hard blows in his vital but soft areas, the loss of which will throw him off balance and incapacitate him for further operations, or at least seriously jeopardise the progress of his subsequent operations if the move is timely and unexpected. This may necessitate deep penetration into enemy territory on a front that will be determined by the size of the force, the opposition, and the nature of the terrain. The force commander has to strike a balance between security and the results to be achieved. This evaluation will enable him to assess accurately the degree of calculated risk he should be prepared to take. At no stage should he be thrown off balance through lack of security or faulty and inadequate administrative backing.

A great deal of forethought and planning is necessary for the employment of armour on a large scale. Armoured forces must be backed by

efficient movement plans and administration coupled with the highest degree of secrecy. Armour held in depth is a constant, potential strategic threat to the enemy who must be kept guessing as to where and when it might strike, for armour thrives on surprise and concentrated, hard-hitting power which aims at paralysing the enemy. The movement plans, secrecy and administrative backing must all be so designed as to permit this strategic arm to concentrate in a minimum of time and strike before the enemy wakes up to realities. It is, therefore, imperative that the employment of armoured formations should develop in accordance with deliberate planning and correct strategic positioning of armour before the impending operations and should form an important ingredient of the theatre commander's plans.

BROAD TACTICAL ASPECTS

Half the battle is won through sagacious planning, strategic movement and timely concentration but the other half of the battle may be lost if tactical deployment is not bold and imaginative and if the commander's appreciation as regards terrain and objectives has not been made properly. Hesitant deployment and lack of boldness on the part of field commanders can be injurious to the overall aims, and indeed they may 'miss the bus', should the enemy react quickly and unexpectedly and take effective counter-measures. The use of armour demands thorough understanding of the terrain and its effects on mobility. Without this understanding, commanders will only waste their armour or fail to use it to the maximum effect. Therefore, the assessment of terrain for the use of armour is a prerequisite to any operation and all methods of obtaining information should be employed. At lower levels, personal reconnaissance is a 'must'. Many an operation gets 'stuck' should tanks get bogged down before an unknown obstacle, resulting in waste of time and effort with an adverse effect on subsequent operations.

It is generally accepted that armour is decisive and most effective against the enemy's 'soft' elements. Armour aims at penetrating deep and hitting hard at the enemy's soft but vital spots on the flanks or in the rear, thus achieving results which sometimes can be conclusive. The reader might recall that in the early stages of the North African Campaign during World War II the concept of employment of armour was one of seeking to destroy enemy armour by armour. Consequently, the Allies, though at times numerically superior in tanks, lost heavily against the German Panzer Divisions. This concept of 'taking the bull by the horns' proved very costly to British armour and was later modified to a great extent by FM Montgomery when he used his armour to lure the enemy's armoured forces on to well selected and prepared positions occupied by his own armour. Whatever the mode of employment of armour, it is

bound to come up against enemy armour sooner or later. Plans, therefore, should be laid well in advance to deal with it effectively on ground of one's own choosing. Indirect approach rather than headlong hammering against the enemy's anti-tank defences or armour will generally be more rewarding. The following basis of planning and execution in armour operations may prove useful.

TACTICAL EMPLOYMENT

Armour must occupy, with swift and determined action, the tactically important ground or sector which the enemy will be obliged to try to reoccupy in order to safeguard his vital areas and to ensure the safe conduct of his future operations. The objectives should be so selected that, if occupied, they will endanger the enemy's future plans, and thus compel his armour into attacking when he is at a disadvantage. While planning such an operation, proper equilibrium must be maintained within one's own forces. This might be ensured through temporary dynamic defence by a composite force while the 'teeth' are engaged in achieving a decision through offensive operations. Coordinated action by armour and artillery will be necessary, with the infantry occupying vital ground to serve as a firm base should our armour be placed at a disadvantage at some stage of the operation. Such an arrangement is necessary to permit armour to regain its balance for effective counter-action.

If the strategic move of armour is well-timed and correctly carried out, it will certainly achieve surprise, thus rendering the tactical employment of armour by junior leaders much easier. A well-timed move will place our armour vis-a-vis enemy armour at a tactical advantage in regard to time and space, so vitally necessary for the fire-fight to follow. The killing areas should be well selected and organised for fluid battles so that any move by enemy armour to bypass or penetrate our positions is foiled and the maximum toll taken. As the tactical employment of armour envisages the bringing up of tanks to a tactically advantageous position in order to engage the adversary effectively, the following points need to be borne in mind if the fire-fight is to be staged with success, for it is this phase which will decide the issue:—

(a) The tanks already in position will have a tactical advantage over the ones on the move for they have the benefit of knowing the ground and an accurate idea of the range over which enemy tanks are likely to traverse. Therefore, to be in position before the enemy should be the first and foremost endeavour of armour commanders.

(b) During battle there is much excitement and a tendency to move unnecessarily. The movement of tanks, except when absolutely necessary, should be avoided especially when the enemy happens

to have the advantage of being in a position to shoot. Readjustment of position or manoeuvre should be carried out by bold, wide moves avoiding accurate fire by enemy tanks.

(c) In a tank-versus-tank battle only the tanks which shoot first and accurately will survive and get a chance to shoot again. This initiative can be achieved only if the tanks have been skilfully positioned and the crews work with efficiency and precision.

(d) During the fire-fight, at no stage should our tanks be put off balance either by the pressure of enemy armour or by faulty deployment. Such an eventuality may result in unnecessary casualties and ultimate set-back. The disposition of tanks should be such that there are always some tanks in depth to support any flank during battle.

(e) Tactical employment must include, if opportunity offers itself, plans for luring enemy tanks on to well-laid anti-tank traps organised either by tanks, or anti-tank guns or a combination of both. Such tactics with imaginative and skilful execution can produce positive results.

SOME TECHNICAL ASPECTS

To successfully execute tank missions against enemy tanks, it is essential to know the characteristics of enemy tanks and to assess their effectiveness **vis-a-vis** our own tanks. This will enable our tank commanders to use tanks according to correct evaluation of their relative fire-power and mobility and to adapt their tactics accordingly. It has been amply proved that even inferior armour can knock out superior armour if used skilfully on the battlefield. This is an important aspect of the armour commanders' knowledge; they should be conversant with the capabilities of enemy tanks and know how best to employ their machines against them, especially in terms of range and concealment.

During battle, ammunition and fuel get exhausted with surprising rapidity. These two commodities are essential to sustain the fighting capability of tanks. Situations will arise when it will be tactically difficult and, at times, impossible for 'soft' vehicles carrying petrol and ammunition to reach the tanks. Regimental commanders must be prepared for alternative means to be employed for this urgent task of replenishment. The writer is of the opinion that some tracked vehicles such as bren-carriers could be effectively employed for carrying ammunition and fuel replenishments to forward areas. Lack of ammunition and fuel could be serious battle limitations which could be tackled only by good planning and forethought on the part of commanding officers.

The recovery and repair system in the field must be efficient in order to prevent the depletion of the fighting strength of tanks to a precarious

minimum. The recovery and repair system of the Germans in the North African Campaign was as good as their bold tactical doctrine. Not only did they repair their own equipment at great speed in the forward areas but also used captured enemy equipment to great advantage.

The fighting strength of tanks in battle dwindles rapidly through enemy action and various other technical causes. Unless supreme efforts are made both by unit repair organisations and higher echelons, there may be serious repercussions during sustained operations. The technical personnel employed on repair work should apply to their tasks energy, skill and devotion of the highest order.

Replacement of battle casualties both in men and fighting vehicles must be fast and smooth. Sufficient reserves of tanks should be held well forward in the theatre. Tanks held in reserve should be battle worthy with their full complement of trained crews so that the induction of new tanks does not in any way affect the fighting efficiency of a sub-unit.

CONCLUSION

Armour is a strategic arm and, if launched with proper planning and speed in an area where it can develop its full power and jeopardise the enemy's plans by hitting him in a sensitive spot it can produce telling results. To achieve this, efficient movement plans must be drawn up with due regard to secrecy. Once surprise is achieved at the strategic level, the tactical employment of armour becomes easier. In tactical employment, due consideration should be given to the technical specifications of the opposing armour in order to arrive at a suitable **modus operandi** for the fire-fight against enemy tanks. **The aim should** be to be in suitable positions before the enemy tanks are expected on the scene and then to shoot first and with maximum effect.

THE CONTRIBUTION OF THE SUBMARINES TO THE AMERICAN VICTORY IN THE PACIFIC

By Lt. Vishnu Bhagwat, I N.

THE submarine's ability to strike at the arteries of the enemy's economy and industry by its attack on shipping, merchant and naval, was proved though not widely publicised. There is a general impression in the minds of people that the war in the Pacific was won mainly by the spectacular efforts of the aircraft carrier, the U.S. marines and the air bombing of Japan. The part played by the U.S. submarines is not sufficiently known and appreciated. This essay seeks to place the contribution of the U.S. submarines in its proper perspective. The comperative failure of the Japanese submarine arm has also been discussed.

The beginning of World War II found the American Navy with 55 large, 18 medium-sized submarines operating in the Pacific and Asiatic Fleet out of a total of 111, not counting 73 under construction. These were to be one of the most decisive weapons of the Pacific War. Nearly 1/3 of all Japanese combat ships destroyed were their victims and no less than 63% of Japanese shipping accounted for by the American submarines. The U.S. submarine force represented an outlay of just 0.7% of the Navy's total expenditure.

Fleet Admiral Nimitz, while he was still a very junior officer, had predicted that the submarine would play a dominant role in any future war at sea. Admiral Chester Nimitz, who became the Commander-in-Chief of the Pacific Fleet after the Japanese attack on Pearl Harbour, said : "Future students and historians of our naval war in the Pacific will inevitably conclude that the Japanese Commander of the Carrier Task Force, which mis-wrought so much damage at Pearl Harbour on 7th December, 1944 missed a golden opportunity in restricting his attacks to one day's operations and in the limited choice of his objectives. The capital ships he sank or severely damaged could not have operated in the far western Pacific for many months, whereas our submarines began unsupported operations in Japanese home waters immediately after the commencement of the war.

"That the Japanese Naval Command failed to evaluate the worth and potentialities of our submarines, is incredible. They know of our dependence on dockyard and the fuel supplies and on the submarine bases all of which were objectives of the first importance. They knew

that all the fuel storage was above ground and very vulnerable. Finally they were aware that only that branch of the Service could operate effectively at once in the critical waters between Japan and the East Indies.

"Fortunately for the United States, our great submarine base in Hawai with its supplies and facilities and our submarines were undamaged. When I assumed command of the Pacific Fleet on 31st December, 1941, all our submarines were already operating against the enemy, the only unit of the fleet that could come to grips with the Japanese for months to come.

"It was to the submarines that I looked to carry the load until our great industrial activities could produce the weapons which are so sorely needed to carry the war to the enemy. It is to the everlasting honour and glory of our submarines service that they never failed us in our days of great peril".

It is interesting to note that the other two Commanders-in-Chief of the U.S. Navy, Admiral King and Admiral Hark, like Admiral Nimitz, were also submariners.

During the first four months of the war the submarines fought doggedly under great handicaps against a confident and aggressive enemy.

The Pacific Submarines came under "Com. Sub. Pac.",* which was further divided into four operational Commands, North, Central, South and Southwest. Submarines were organised in divisions and squadrons depending on the locale and the type. In the early part of the war, Admiral Nimitz himself directed submarine operations but later transferred them to Com. Sub. Pac.

The U.S. Fleet's basic doctrine was "The primary task of a submarine is to attack enemy heavy ships. A heavy ship is defined as a battleship, battle-cruiser or an aircraft carrier". After unrestricted submarine warfare was ordered, the employment of the submarines to lance the arteries of the enemy trade became of major importance.

The American concept of submarine warfare, dictated by the few and far between bases, required self-sustained long-range cruising submarines. The big 2,000 tonners often doubled as minelayers and troop transports.

American submarines operated from Hawaii, and from Freemantle and were supported by British submarines from the East Indies Station.

Every boat on patrol was a threat and the Japanese who had expected to be able to navigate their home waters in perfect safety were forced

* Com. Sub. Pac.=Commander Submarines Pacific.

to draw precious destroyers from the fleet for escort purposes. Many of the unlucky boats brought back valuable intelligence, and some, by their very failures, saved later patrol boats from wasting time in barren waters.

The sea lanes from Japan south to Truk and thence on to the South Pacific were the logistic link between the Japanese homeland and the front. Here the Central Pacific boats struck telling blows at shipping, at the same time, indirectly supporting fleet operations.

To the 51 submarines fell the unique responsibility of the improvised defence, to them fell the task of intercepting the Japanese naval forces plunging down the Philippines, of slashing the enemy's communication line, of running interference for the Allied naval forces fighting to hold the Malaya Barrier, of dealing with that 4 million tons of shipping allocated to the enemy's war machine and the 2 million tons devoted to the maintenance of Japanese economy. Japan was a body of land completely surrounded by a submarine's favourite element—surface ships.

In the beginning of the war, submarine torpedoes were so faulty that the submarines when they saw torpedoes hitting but not exploding came on the surface and shot with their guns. Just imagine after cruising 8,500 miles and arriving within 800 yards of the enemy ship there were such considerations as that the torpedo might not explode! It was the submariners themselves who suggested the remedy for the defective magnetic pistols of the torpedoes.

In the beginning of the war excessive caution was another deterrent to action. Submarine tactics improved as the war progressed; night attacks on the surface with a combination of radar and periscope attacks, penetration of enemy harbours, counter-attacks on escorts became the common practice. The submarines, their equipment and their torpedoes also improved.

No. 1 Mission to Sink Everything Afloat under the Japanese Flag

Immediately after the attack on Pearl Harbour a considerable Japanese force intended to attack Midway. As the force approached U.S.S Argonaut fired her dud torpedoes on the Japanese cruiser and destroyer force, and even though they did not explode the force retired. Here at the outset of the war was an example of the submarines ability to divert surface forces and disrupt an enemy attack. It will seem surprising to read that submarines like the Pollack left Pearl Harbour shortly after 7th December to attack the Tokyo Bay waters. The submarine could count on these waters being heavily guarded.

The American submarines based at Manila also escaped the air attack. The small force of submarines began to be deployed in Darivo

Bay, patrolling off into China, advancing to meet the enemy in Northern Philippine waters — a total of 25 submarines against the titanic Japanese offensive in Philippines.

Undersea Lanes to Victory

The submarine forces "got in there" and fought. The submarines based at Manila diverted the enemy's naval vanguard, harassed the flanks of the Japanese Second Fleet and impeded the drive in Netherlands East Indies. Pearl Harbour submarines joined battle in the Central Pacific, patrolling, cutting shipping lanes to Japan.

With Mid-Pacific bases lost, Manila lost, with air cover lost—the Pacific Fleet immobilised, reinforcements and replacements leagues away, the submarine entered the conflict and kept on going. They kept on going despite the fact that the enemy had the initiative. For about two years the submarines kept on going with defective torpedoes. In spite of all this and other handicaps, the submarines led the U.S. offensive. Through waters blasted by Japanese depth-charges and air bombs, the submarines carried the fight to the enemy.

They aided in the defence of Midway and battled the enemy in the Alutians. They helped to parry the enemy's thrust at Guadalcanal. They blockaded the ports of the Japanese home empire, cut the sealines to the China coast, to Malaya and East Indies, laid mines, reconnoitred for air strikes, struck the Japanese Navy some of the hardest blows that it ever received, and swept the merchant fleet off the Japan from the sea lanes and penetrated the Sea of Japan and finally halted, presumably for lack of wheels, at the beach heads of Kyushu, Shikoku, Hokkaido and Honshu.

Special Missions. Generally the older boats were given these tasks.

Reconnaissance including those of Hokkaido and Honshu, evacuation, transportation of intelligence agents, life-guarding (about 700 American ditched pilots were picked by submarines), minelaying, weather reporting, anti-picket boat sweepers, support of commando raids like the famous Makin Island raid, marker beacons for surface ships in amphibious operations, form special missions carried out by U.S. submarines. Near the end of the war submarines were ready to play the part of aircraft warning radar picket—a role formerly held by the destroyers.

Operation Barney

The Japanese had declared that minefields between Korea and Japan and in the Japan Sea could not be penetrated. The U.S. submarines had

got a new mine-detecting device which would permit them to detect mines in the waters ahead. These submarines came to be known as the Mighty Mine Dodgers. From then on, Japanese shipping with Manchuria and Korea also ceased — the submarine ring round Japan had been completed.

Submarine Support of Fleet Operations

After May, 1942, a small number of submarines functioned as a fleet arm. In the Battle of Midway submarines were deployed to scout and report the location of the Japanese fleet, to intercept and attack. Submarines signalled the presence of Yomamato's Fleet 600 miles west of Midway. One of the war's famous battles, Midway developed as an air show. Planes did most of the attacking, and there were no blows traded between surface groups. But submarines on both sides dealt deadly blows and throughout the combat their influence was a strong undercurrent on the battle's tide. In particular, U.S.S. Nautilus ended the life of aircraft carrier Soryu. Two Japanese cruisers including the Nogami were involved in serious collision as they manoeuvred to avoid submarine torpedoes. It was realised at Midway that submarines must be equipped with radar and this was done soon.

In the Battle of Philippine Sea in June, 1944, U.S. submarines sank 2 aircraft carriers, the Tacho and the 35 knot Shokaku in what is known as the famous Carrier Battle. Total loss on both sides were three carriers lost by Japanese and one American carrier damaged.

Japanese naval bases like Truk were successfully blockaded by submarine before final capture. In the Solomons and Guadalcanal, submarines played a gallant part in strictly amphibious operations.

Submarines Vs. Japanese Navy

When U.S. submarines set out to execute "unrestricted warfare" every Japanese ship afloat was on the submarines extermination list. But public enemy no. 1 was Japanese Man-of-War. The U.S. submarines started a relentless hunt for Japanese warships, and they might have hit harder had they been armed with a dependable torpedo. At the end of the war their score was:—

7 Aircraft Carriers
1 Battleship
10 Cruisers
30 Destroyers
25 Japanese submarines or 20% of the submarine sinkings.

BLOCKADE OF JAPAN

Blockade of Japan was recognised, early in war, as one of the most effective methods of bringing about her defeat.

Japan's meagre industrial capacity and resources generally rendered it impossible for her to support a long war against a country like U.S.A. which had deep reserves, for example, Japan with Korea and Manchuria produced 9 million tons of steel while the U.S.A. produced 80 million tons of steel annually. Japan was heavily dependent on raw materials specially petroleum, rubber and non-ferrous metals. In fact, without exception, she had to import all raw materials for her industry and 20% of her food requirements. Her economy was based on foreign trade.

The Achilles' heel of Japan was her shipping. The Japanese underestimated their probable war losses and in spite of them never realised that they were doomed as their shipping went down. At the beginning of the war Japan had 6 million tons of shipping, later increased to 8 million tons. Of these submarines accounted for nearly 5.5 million tons.

War Against Shipping

Attrition war waged by U.S. submarines against Japanese shipping can be seen as a triple purpose operation. Its moves were aimed at three elementary objectives:

I — The cutting of supply lines between the Japanese outlying bases—a move obviously related to maritime strategy.

II — The cutting of transportation lines between conquered territories and the home empire—a move to prevent the exploitation of those territories and thus deprive the Japanese homeland of foodstuff and vital raw materials.

III — The cutting of transportation lines between the home empire and colonial and other foreign markets—a move to liquidate the enemy's overseas commercial enterprises. Summing up they meant the ruination of Japan's economy.

Most of Japan's domestic trade was water-borne. Japan's principal cities were seaports. The life-blood of their war machine was oil. Without oil the Japanese navy would rust at anchor, the army and air force would jolt to halt. Few nations were more dependent on shipping than Japan.

Tourniquet on Tokyo

While the exploits of the Silent Service were not splashed across the front pages of newspapers, the Japanese Emperor's subjects witnessed

the destruction done by the submarines even at their maritime doorstep. Blockade strategy called for a chain of submarine patrols which would embrace the Japanese home confines from Kancho down to Narsu Shot and reach across the East China and Yellow Sea to the East Coast. This was done by submarines.

During 1942 submarines had caused tremendous losses to Japanese merchant and naval ships. Japan's economy had begun to crumble. The enemy's bases were half-starved and the Japanese navy began to limp.

In the light of this war effort (16 submarines employed in the West Pacific) by such a small submarine force, a layman may logically wonder why the United States Navy was not ordered lock, stock, and barrel to the shores of Japan. Why its entire submarine fleet and all its surface and air force were not concentrated *en masse* to blockade and reduce the enemy's homeland?

There were armchair and even editorial chair strategists who made such proposals, forgetting that the submarine's singular ability to operate unseen behind enemy lines was a feature not common to surface ships and aircraft. The undersea blockade could get in where battleships and carriers could not.

The Japanese Submarine Force

The Japanese blamed their submarines failure due to lack of radar, clumsy, shallow diving boats, but it was mainly due to their out-dated concept of submarine warfare that they failed.

After the Pearl Harbour attack the Japanese submarines continued functioning with the fleet and for supporting the army.

Despite the example of German near success in the U-boat attacks on British economy, the Japanese held the function of the ocean-going submarine to be support of fleet operations, particularly the attack of carriers and battleships. They were used for screening the fleet as for Pearl Harbour attack, recce* of harbour and bases as at Midway in June, 1942 and ambushing as in Marianas Operations in July 1944. Aircraft carried by submarines were used for recce. The submarines were rushed from anticipated to actual point of attack, usually too late and exposed to destruction through travelling on the surface. There was natural demoralisation effect on the submarine force. As the war progressed submarines began to be used to support army island bases and this was because the submarine was the only vessel which could move in disputed waters with comparative immunity.

* Reconnaissance

The Japanese submarines did badly at Midway, doing much better in Guadalcanal sniping at aircraft carriers. In the undersea war in the Solomons the Japanese submarine sank the Carrier U.S.S. Saratoga. On 15th June Aircraft Carrier Wasp, Cruiser North Carolina and Destroyer O'Brien were sunk within 10 minutes by Japanese submarine I-19.

The Japanese submarine boats refuelled big sea-planes on ineffective bombing missions, like the one against Oahu in March 1942. They conducted long cruises to carry out nuisance bombardment as in Midway. They carried scouting aircraft great distances to make recce. flights of negative value, like the one to Seattle. Even after a few submarines reached the west coast of America and caused great alarm, they were directed to destroy such worthless objectives as lighthouses. But the mortal blow to a successful undersea warfare was the Japanese army's discovery that the boats could carry supplies to isolated garrisons. They began to be used as sea-going Pack Mules. The navy resented that sort of employment but Tokyo forgot their strategic role and wasted them. Thus while there were many other causes of the comparative failure of the Japanese submarine, one stands out like the rising Sun—the misconception engraved in the topmost minds of the Military and Naval hierarchy. Better submarines doctrine could not have won the war for Japan, but employment of the boats against the vulnerable supply lines, both the trade routes and fleet trains, would have cost the Allies dear in ships, goods and effort, and delayed the final outcome far more than did the fanatical last ditch defence of the indefensible islands.

During 1942 the Japanese Submarine 6th Fleet was a "Fleet in Being" and the Americans expected that enemy submarine would harass their shipping lines. By 1944 they allowed unescorted merchant ships to cross the Pacific, without loss, and the American Logistic Groups operated without fear.

While the Japanese defence perimeter extended to only 3,000 miles from the main island the Americans bases at Pearl Harbour were 4,700 miles away and had to be supplied from the heart of America. Similarly the British base at Singapore was some 6,000 miles away. American bases in Australia were about 7,000 miles distant and it required a shipping effort twice the size necessary for the support of American forces in Europe. The Japanese had the advantage of far-flung net of island bases, and their submarine could reach the patrol areas faster than the American submarines and stay there longer.

The Germans frequently urged the Japanese to use their submarines against enemy shipping in the Indian Ocean and on the America-Australia route. Some half-hearted attempts were made to disrupt the enemy

lines of communication but they were made in insufficient strength to have any result. The Japanese just did not understand what use it was to attack Allied shipping. This seems to be an incomprehensible attitude.

The Japanese submarine force seemed to lack a primary mission, a clearly-defined programme. Japanese Navy leaders sought its services for fleet operations. Generals demanded I-boats for transport and supply. Frequently the submarine came under the control of the army. The result was a dispersal of effort.

The misdirected Japanese force has, however, some heroic special missions and actions to its credit including the sinking of a significant number of Allied naval ships.

CONCLUSION

Neither the Air nor the Mining, singly or in sum, pulled as great a weight in the blockade of Japan as the operations of submarines.

In the Pacific we see the tremendous effect of the naval blockade exercised chiefly by submarines. Japan indeed was facing defeat even before the Allies had reached the geographical position from which attack on and subsequent invasion of the Japanese homeland could be made. Whilst great and spectacular air battles were taking place over the Coral Sea and Midway, whilst advance was being made inch by inch in the South West Pacific and by giant strides in the Central Pacific, U.S. submarines were silently going about their task of sinking Japanese shipping and cutting the Japanese lifelines one by one.

For those who think that Japan capitulated because of the geographical advance by Allied, Naval and Surface units here are some eye-opening figures. By the middle of 1943 Japan was reduced to importing half of what she imported for her normal peace time needs in 1940. Her foreign trade had dropped by 60%. By 1944 her merchant tonnage had been reduced to 16% of what it was in the beginning of the war and her economy had collapsed.

At the time of the Argonaut conference in Washington in January 1943, Allied submarines had greatly reduced the Japanese power to continue the war. In fact, in January 1943 when the final operations against Japanese were decided upon, sinkings had reached such proportion that the Japanese finally abandoned the use of sea lanes and therewith all they had at the beginning of 1942.

The excess of losses over capacity to build quickly set up a vicious cycle. By preventing the exploitation of captured sources

of raw materials it kept the country's economy off balance and created a shortage of raw materials. These in turn limited war production; and deprived the country of oil in such quantities as to bring training of Air Units to a halt and finally immobilise the fleet. Steel was so scarce it could no longer be used for shipbuilding; oil reserves were on the verge of exhaustion and railway transport on the point of being confined to local areas. The food situation had deteriorated beyond control.

The country had been brought, through submarine blockade, to a state in which the air force and the army were powerless to prevent extermination of the nation's economy, industry, communications and thus her final defeat by air attack. The atom-bomb attack was only a **coup-de-grace** to an already defeated enemy. It has been said that the Japanese lost the Pacific War when her forces lost control of the Central and South-West Pacific. Some consider Midway the turning-point, others point to Saipan. But all agree that Japanese conquests could only have been supported and exploited by her merchant fleet. It might be said the Japanese lost the Pacific War when the losses of her merchant fleet exceeded all possibility of replacement.

What was the strategic value of the losses incurred by the enemy due to the submarine? Besides one-third of the Japanese naval ships accounted, how much did the submarine blockade cost the navy and armed forces? One has to calculate in terms of enemy air offensive moves disrupted, defences undermined and battle defeats which were due to inadequate logistic support and irreplaceable equipment and ships.

German Admiral Wenker has done an impartial analysis of the causes of the Japanese defeat:

"Japanese overconfidence, underestimation of the Enemy and overextended lines of supply which could not be protected were basic causes; after that I would say the reason for their defeat could be classed in order of importance—

First —attacks by submarines on Shipping, merchant and naval.

Second—destruction of the Japanese Navy, and

Third —air bombing **attack".**

ADVENT OF THE GUN AND IT'S EARLY HISTORY IN INDIA

By Major A.P. Gupta

FROM time immemorial man's ingenuity has ceaselessly striven to devise better and effective weapons of offence and defence. It is, however, difficult to pinpoint exactly as to when the era of arrows, catapults and battering rams came to an end and when the era of gunpowder was finally ushered in. In this article it shall be my endeavour to trace briefly the history of the gun and its manufacture and initial development, elsewhere and in India, from the time gunpowder was first used for propulsion of missiles.

The principle of the gun is essentially different from that of the other engines of war. In this the projectile is imparted velocity at the desired elevation by the sudden expansion of the gas produced due to the detonation of some explosive material. The gun described simply is a vessel which when loaded is closed from all sides and only one side (muzzle side) of which can give way under a certain desirable pressure. It is the pressure produced by the gases due to detonation of some explosive material in the chamber of the gun that ejects the projectile out of the gun with a certain amount of force on which amongst other things mainly depends the 'range' of the projectile. Thus the gun and the ammunition (charge and the projectile) constitute one unit. Neither can be effective without the other. And it seems improbable that the gun would have taken its present shape without the discovery of the gunpowder as the necessary propellant.

It is common knowledge that gunpowder was known in India and China long before it came to be known in Europe. No festival in ancient India was complete without a display of fireworks. What really constituted these fireworks was in fact a highly combustible material—a sort of gunpowder. Saltpetre, an important component of the gunpowder, was well known in China and was called the Chinese Snow. A very early knowledge of gunpowder and artillery has been attributed to the Chinese and some writers have gone to the extent of saying that they employed cannons as early as in 87 A.D. Gibbon, relying on the authority of Pere Gaubil, writes that the use of gunpowder in cannon was a familiar practice in ancient China.* It might also be mentioned here that Marco Polo when referring to the manufacture of mangonels during a siege by Kubla Khan does not mention the employment of cannon.

* Gibbon: **Decline And Fall of The Roman Empire,** in 8 Vols, Vol. 8 Bevey's Edition. Page 86, London.

The Arabs were, it seems, certainly familiar with some kind of substance resembling gunpowder though some take it only as some sort of fire-powder.* Ibn-i-Khaldoon states that Sultan Abi Yusuf of Morocco employed in A.D. 1273, in the siege of Sajlamasa, a machine which used gunpowder. In an old manuscript two Arabs are shown fighting holding gun over a flame.** Colonel Fave in his **Historie de L' Artillerie** 1845, definitely attributes its invention to Arabs. Some other historians give credit to Arabs for devising a crude type of fire-arm called 'Midfaa' as early as in 1304 A.D.; but the evidence to support this view has been scanty. Researchers did not find any convincing evidence that any of the crusaders encountered any fire-arms from the Turks during the Middle Ages.

'BAN' OR 'VANA'

Before the invention of gunpowder, bows and arrows went in the guise of artillery of armies of ancient India. Rockets have been used in ancient India and were called 'ban' or 'vana'. In Europe also the earliest missiles were arrows padded out to fit the bore of a pot-shaped vessel. The reference by Mac Ritchie in his book **Gypsies of India** (page 207) that the gypsies (whom he identified with the Jats) brought the use of artillery into Europe*** is based on the 'vanas' being called artillery. One is led to believe that artillery existed in ancient India before it was known to the people in the Continent or elsewhere. This view is further substantiated by a translation of Persian version of ancient Hindu Laws made by N. B. Halbead of Bengal Civil Service (1776). The translation reads : "The magistrate shall not make war with cannon and guns or with any other kind of fire-arms". Author after author have accepted this translation as correct whilst some have strongly questioned the accuracy of the translation. It is common knowledge that Indians had very advanced knowledge of metallurgy and casting. Amongst other things the iron pillar standing by the side of Qutab Minar has through the centuries, testified to this fact. The fact that they might have manufactured guns and used them seems very probable.

* **Quarterly Review,** July 1868, Pp. 106-8, London.

** Tamadan-al-Islam-Jurzi Zaidan Urdu Translation, Vol. I, Pp. 198-299.

***Contemporary history of the arm in India, however, proves the fact to be quite the reverse.

In 1519 Babar attacked Bajour. About breaching of the fort he says: "Ustad Ali Kuli Khan was also there and that day too he managed his matchlocks to good purpose; the feringi piece was twice discharged". Babar here and in many other places calls his larger ordnance 'feringi' ... a significant pointer strongly suggesting that the guns owed their origin to Europe. (See **Memoirs** of Babar in two Volumes by King).

'YANTRAS' IN THE EPICS

The existence of artillery as an apparatus of war in ancient India has, however, been a subject of great controversy. On one hand it is most vehemently asserted that gunpowder was well known to the ancient Hindus and that this country has the claim of being the first to devise fire-arms. Others deny this contention, with equal vehemence. To start with, all scholars are agreed that there were no fire-arms in use during the Vedic period. All agreement on the issue amongst scholars and critics, however, ends at this stage. In the 'Sunderkanda' there is a reference to 'Yantro-tksipta ivopalah' i.e., like stones thrown by machines. In the 'Lanka-kanda', the poet while describing the defences of Lanka says: "There are big and strong **yantras** to throw stones and arrows and these can repel a hostile army when it approaches the city." A few lines later we read: "At the gates of the city there are four broad bridges, provided with **yantras.** These prevent enemies from making an assault on the city and throw them in the surrounding ditches". Quotations like this can be multiplied but it is abundantly clear that some of the **yantras** were large and heavy engines, generally used for discharging heavy bolts, stones and arrows. Little now is known as to what provided the motive power or what produced the terrific noise when these were in action. These may therefore be looked upon as the artillery of Indian armies of ancient times and as such these seem to have been regarded by them. In the sixfold division of the Hindu army as contemplated by Manu and 'Santi-parva', the **yantras** have been assigned one independent division*. The words **sataghni, yantra,** etc. used in the epics are interpreted by some as equivalents of mechanisms for throwing stones. Others regard them as exact equivalent of cannons and guns. The former school of thought is led mainly by Prof. E. W. Hopkins and the latter by Dr. Gustav Oppert.

KAUTILYA AND SUKRA

It might be mentioned here that there is hardly any word in the epics that could be interpreted as gunpowder. So its discovery must have come after the epics. Two authors of ancient India give us the formulae embodying the ingredients that go to compose inflammable powders. The authors are Kautilya and Sukra; the Kautilya's formulae are:—

(a) Powder of 'Sevala' (Pinus longifolia), 'devadru' (deodar), 'Putitrna' (Stinking grass), 'guggla' (bedellium), 'srivestaka' (turpentine), the juice of 'sajja' (vatica robusta), 'laksa' (lac), combined with dung of an ass, camel, sheep and goat are inflammable **(agnidharanah).**

* **The Art of War in Ancient India by P. C. Chakravarty.**

(b) Powder of 'priyala' (Chironjia sapida), charcoal of avalaguge (oenyza serratula, anthelminitica), 'Madhucc Pista' (wax), dung of a horse, ass, camel and cow.

(c) Powder of all metals (sarva loha) or powder of **Kumbhi** (gemiliarberea), **sisa** (lead), **tarpu** (zinc), charcoal powder of the flowers of **paribhadrakha** (deodar), **palasa** (butea frondosa), hair-oil wax and turpentine.

Gunpowder as we know of it today contains sulphur, charcoal and saltpetre in certain proportions. The formulae apparently do not contain all these ingredients. In the first formula no specific reference to charcoal is made and though the other two formulae do contain it the question whether they include saltpetre and sulphur remains dubious. The compositions given by Kautilya are inflammable indeed but, it seems, it will be stretching it too far if we say that these were also high explosives as gunpowder most assuredly is. Also nowhere does he refer to its possible use as a propellant.

Sukra, however, gives the composition of the genuine gunpowder. His formula is, four, five, six parts of suvarci salt (alum), one part of sulphur, one part of charcoal of 'arka', 'suni' and other trees mixed together, then dissolved in the juices of suni, arka and garlic and dried up with heat.*

OPPERT'S THEORY

This along with the arguments put forward by Dr. Gustav Oppert, one is inclined to believe that the ancient Hindus were perfectly acquainted with the mechanics of the gun. The arguments put forward by Dr. Oppert are:—

1. In an apocryphal letter, which Alexander is said to have written to Aristotle, he described the frightful dangers to which his army was exposed in India when the enemy hurled upon them (Greeks) flaming thunderbolts. (In conjunction with this point put forward by Dr. Oppert, the reader would also be interested in knowing that the controversy regarding the discovery of gunpowder has been condensed by Lord Bacon in his essay "On the Vicissitude of Things" and he thought it certain that ordnance was known in the city of Oxydraces in India in Alexander's time.** Also Colonel Chesney in "Observation on the Past and Present State of Fire-arms Vol. I" states that many circumstances, however, seem to point to the use of cannon in China at a far earlier period than that of Alexander's (300 B.C.). From the fact that most of the scientific inventions originated

* **The Art of War in Ancient India** by Govind Date.

** Mallet's **'Physical Condition Involved in the Construction of Artillery'**—1856 edition, page 175.

in India and then trickled down to China, it would be reasonable to assume, that what was known in China about the science of gunnery could have hardly remained unknown in India.

2. Colonel Tod says in his **Annals of Rajasthan:** "We have in poems of the Hindu poet Chand frequent indistinct notices of fire-arms, especially the nalgola, or tube ball; but whether discharged by percussion or the expansive force of gunpowder is dubious."

3. The description given by Sukra (about the **nalika yantra)** tallies with an account concerning the fortification of Manipur, as described in Mr. J. Talboys Wheeler's **History of India:** 'On the outside of the city were a number of wagons bound together with chains and in these were placed fireworks and fire-weapons'. But this 'sloka' does not occur in any manuscript copy of *Mahabharata* which Dr. Oppert had searched.

4. In the battle near Delhi, fought between Timur and Sultan Mahmud, there were big howdahs on the elephants of the latter from which the sharp-shooters flung fireworks and rockets on the enemy's troops.

5. Vaisampayana mentions, among other things to be used against enemies, smoke balls, which most likely contained gunpowder.

6. Two of the ingredients of gunpowder, charcoal and saltpetre, were abundantly obtainable in the country itself. Sulphur though found in Sindh was largely imported from outside. The properties of these chemicals were known to Hindus and they were considerably used for medicinal purposes.

7. A verse from **Nishadha Kavya** runs as follows: 'The bows of Rati and Manmatha are certainly like her two brows, which are made for the conquest of the world; the two guns of those (Rati and Manmatha) who wish to throw balls on you are like her two elevated nostrils'.

8. An extract taken from **Myjamalat Tawarikha,** which was translated a century ago from a Sanskrit original reads: "That the Brahmins counselled Hall to have an elephant made of clay and to place it in the van of his army and when the army of the King of Kashmir drew nigh, the elephant exploded, and the flames destroyed a great portion of the invading army'.

9. The following stanza is taken from Rajalaksmi—"Narayana Hardaya"—a part of **Atharva Rahasya:** 'As the fire prepared by the combination of charcoal, sulphur and other materials depends upon the skill of the maker etc.'

10. Manu in book seven, makes mention of fire-weapons, which Dr. Oppert takes to mean 'cannon'.

11. Temples of Madura, Kumbhakonam, Canjeevaram, Tanjore and Perur which contain representations of fire-arms are according to our notions of antiquity not very ancient, but in judging the age of the subjects exhibited in the carvings of Indian temples we should never lose sight of the fact that new subjects are not introduced in the architectural designs of the principal figures in any Indian ecclesiastical building.

12. India is a land of festivals and fireworks; no festival is complete without the latter.

13. **Sukranīti** gives the exact description of guns and gunpowder **(Sukraniti, IV, 6).**

14. Fire-arms were such powerful instruments of war that anyone who possessed them kept their construction and handling as guarded a secret as possible.

15. According to Ferishta, Hulakhan, the founder of the Mughul Empire in Western Asia, sent in 1258 A.D. an ambassador to the King of Delhi and when the ambassador was approaching, he was received by the Wazir of the King with a great retinue and among the splendid sights were 3000 fire-cars.

OTHER SUPPORTERS

A few more arguments in support of Dr. Gustav Oppert's theory may also be mentioned.

The **Mahabharata** mentions instruments of war which S. M. Mitra* interprets as cannon and guns. 'Tutagudas equipped with wheels and worked by means of air expansions emitting a loud noise like the roar of mighty piled up clouds.'** Engines for hurling balls and bullets are described as being in use at the siege of Dwarka.

Frequent references to **agniyastra** as a powerful weapon of destruction suggest the idea of gunpowder and cannon. **Sataghni** was, it seems, made of iron, as it is compared to tresses of a maiden's hair. It is also described as mounted on wheels and throwing stones and wax.

Sir A. M. Elliot tells us that the Arabs learnt the art of manufacture of gunpowder from India. It is said that the Turkish word 'top' and the Persian 'Tupang' or 'Tufang' are derived from the Sanskrit word 'dhupa'. The dhupa of the **Agni Purana** means a rocket, perhaps a corruption of the Kautaliyan term **nala dipika.** After sifting the available evidence on the subject, Mallet opines: "The conclusion, therefore, seems justifiable,

* **The Art of War in Ancient India** by Govind Date, page 39.

** Guda is perhaps the same as Gula meaning ball projected by a lever or a certain such device (Tula). See **War in Ancient India** by Dikshitar.

that gunpowder, known from a remote antiquity in Eastern and Southern Asia, was not independently re-invented or discovered in Europe; but that knowledge of it travelled westward with the Arabians and with the returning bands of pilgrims and crusaders from Syria and Palestine; and was introduced into the Levant and Spain by former and into Scotland, England and Germany by the latter."

Ferishta tells us that in Anand Pal's battle with Mahmud in 1008 A.D., his elephant fled away with the noise of **naft** (naphtha)* and arrows (Khadang). A Hindu poet in 1200 A.D. speaks of the "loud reports, the noise of projectiles" as heard at a mile's distance. In 1368 A.D., Mohammud Shah Bahmani captured in India 300 gun carriages.

Carpini writing in 1246 A.D., says he "observed that the armies of Prister John had copper tubes which mounted on horse back vomitted in a wonderful manner (he knew not how) fire and smoke whereby his enemies were struck and overthrown**. These seem to have been the predecessors of the camel batteries so common in the East at this day."

DOUBTFUL SIGNIFICANCE

All these points looked upon objectively are from a historian's point of view are merely points of doubtful significance which can hardly be taken as corroborating evidence in support of the theory put forward by Dr. Oppert and his supporters. The first point has to be discarded, since a mythical letter cannot be held as a record of historic facts. Poet Chand's testimony is not sufficiently convincing even to Colonel Tod, who alludes to it. Dr. Oppert did not find the 'sloka' in any manuscript copy of **Mahabharata** to support J. Talboys Wheeler's contention. Wagons with fireworks and fire-weapons cannot necessarily be interpreted to mean cannon, because fire-missiles and stones were discharged through machines mounted on wagons. Indian warriors, threw from the back of elephants, as they did from fort battlements, boiling oil, wax, burning balls etc., upon the enemy. Sultan Mahmud must have followed the method of warfare adopted by the ancient Indians. Regarding the eighth argument advanced by Dr. Oppert, the testimony of **Myjamalat Tawarikha** would certainly be valid if it could be supported by Kalhana, who being a man on the spot, has a greater claim on being accepted as authentic. Dr. Oppert's assumption that architecture of ecclesiastical variety in India is rather slow in adopting contemporary innovations and current themes is contrary to facts. It shall be totally incorrect to assume that Indians insulated themselves against any new ideas trickling in from foreigners or for

* Naphtha — a mixture of bitumen and sulphur.
** Murray: **Historical Discussions.**

that matter from any other source. Govind Date whilst refuting the arguments advanced by Dr. Oppert, in his book, 'The Art of War in Ancient India', remarks that the Vedic faith has undergone such a varied transformation that there is very little of Vedic customs left with us. We have, during the centuries, very rapidly changed and accommodated several faiths, e.g., Buddhism, Jainism, Saivaism and Christianity, etc. In fact Hinduism of today is a 'museum' of other inelastic faiths. We have so rapidly accepted new ideas that Dr. Oppert's suggestion to the contrary has to be discarded. Even the architectural designs of temples have incorporated from time to time, Greek and Persian styles. The formula of gunpowder in **Sukraniti** is alleged to be a later interpolation.

Other opponents to Dr. Oppert's school of thought, however, have not been lacking. They contend that in reality, reference to flaming substances in the ancient and later historical literature should be taken as use of fire (and not fire-arms) in battles, a feature which was common even in Vedic wars.*

It is just possible that just as the science of surgery was long perfected by the famous Indian doctors **Charak** and **Susruta** fell in disuse and then in some measure got to be re-introduced to India from the West, similarly it can be reasonably conjectured that the Indians were familiar with the know-how of the gun and perhaps due to some self-imposed moratorium the gun came no longer to be made and used.

This can be an interesting subject for research by some interested historian whose main task would be to bring out some unchallengeable evidence in support of Dr. Oppert's contention. But about the gun as it is known today, most accounts seem to indicate that it was introduced or re-introduced to us from the West. This, however, is by no means a categorical assertion. It seems strongly plausible, that 'gun' was known in India at the time, and even earlier than it was known in Europe. Instances to support this viewpoint are quoted in the latter part of the text.

A SUBJECT OF GREAT CONTROVERSY

The question as to who discovered (or rather re-discovered) the gunpowder and took the next step of using the explosive mixture as a propellant has been a subject of great controversy amongst the historians The details of gunpowder were elaborated by an English Friar Roger Bacon (1214-94) who described some of its properties in a volume written sometime prior to 1249. But there is nothing to indicate that he possessed any idea of its possible use as a propellant. In the Continent the name

* **Ideologies of War and Peace in Ancient India** by Indra.

mainly associated with the subject is that of a German monk of 14th century known as Berthold Schwarz or Berthold the Black apparently so named for his interest in the Black art of alchemy. The claim that the year 1313 introduced cannon to the world is based on an entry in the official records of the city of Ghent for that year "Item, in this year the use of Bussen (i.e., cannon) was discovered by a German monk". Even this has not been accepted as the date of origin of the cannon. The best we can say in this regard is that the cannon found nativity in the world sometime between 1320 and 1325. There is no doubt, however, that by the middle of fourteenth century, guns were pretty well in use in Europe. The confusion regarding its date of origin arises probably from the fact that a new weapon does not immediately supersede the old; we know that the primitive method of projecting stone missiles by catapult continued for over a hundred years even after the guns had been fairly in use in Europe. This device of hurling stones by means of catapult contrivances was successfully used as late as in 1779-83 by the British against the Spanish when the latter invaded Gibralter. At times scorpions, poisonous reptiles and even carcases of humans as well as those of animals were lobbed into sieged forts. The lobbing of this last mentioned 'missile' amounted to first attempts at bacteriological warfare.

One might wonder that if the gun and gunpowder existed in our country earlier than what is commonly believed then how is it that they are so rarely mentioned in accounts of sieges and battles. The reason obviously must have been the difficulty in controlling the disruptive force of the gunpowder. The powder-maker's art has been described as 'all dirt and danger'. Nothing can be simpler than to make a rough and crude sort of gunpowder but the manufacture of a strong and clean powder, uniform in its physical properties and in its action is a matter neither of ease nor of certainty. It might be mentioned that even in the Continent the first field pieces were so clumsy and so difficult to manage that Machiavelli recommended dispensing with artillery. It is believed that the French had cannon at the time Crecy was fought but they left them behind considering them as encumbrances. Improvement in artillery no doubt may have been slow in our country. Its less frequent use in warfare should not be taken to connote the absence of it.

Colonel Symns in his 'Embassy in Ava in 1795' informs us that he found "cannon formed of prismatic bars of wrought iron hooped together were known in India from a remote antiquity".

'REMARKABLE' GUN

A remarkable gun of rather an unusual shape is displayed at Fort William, Calcutta, on which is inscribed "ISVI 1186 Ahmed Shah, Nazar Khan Bharatpur". Acceptance of this date regarding the manufacture of

the gun would imply that India had known artillery at a time when the western countries were still using bows and arrows. The metal used and the absence of trunious indicate a very early date of manufacture of the gun. The gun is 9½ ft. in length and the diameter of the muzzle measures 1 ft. 7 inches.

To substantiate the fact the guns were made independently in India at about the same time as in the Continent, the history of the great bombard which now stands opposite the Murshidabad palace need only be quoted. This piece was dug out of the bed of the Bhagirathi river by Mr H. Torreus, the Political Agent at the Court of Nabab Nizam of Bengal.

This remarkable gun also figured in the **Illustrated London News** of 18 Oct. 1851 (p. 501); an extract from which is appended below.

"It is identical in principle of construction with the Gantois gun, with the exception of the chamber piece being separable from the chase to which it is capable of being confined by lashing through rings provided on it and on the chase. The chase part is 12 ft. 6 inches in length, the calibre 18 inches, the chamber piece is 4 ft. 3 inches long. Nothing is known as to the origin or history of the gun, though a vague local popular notion exists of its having been made to resist the Marathas, who at former periods used to descend upon Murshidabad, but as Maratha power only began to rise in the middle of the seventeenth century, on the decline of the Mughul dynasties, when cannons of a totally different and more modern sort were in common use in India, this is out of question.

"This most remarkable gun, identical in principle mode of construction with the ancient bombards of Europe, proves its own oriental origin and construction by the unmistakable style of ornamentation upon its exterior. Either it was made in India or if made in Europe at a period before the wrought iron bombard was disused, transmitted to India and ornamented by Indian artists there. The weight of the gun, the small size of sea-going vessels in the fourteenth century, the partial over-land route to India alone known, the difficulty of transport over that, all make its formation in Europe almost impossible. We must conclude then that this gun was designed and made in India and we cannot conclude it later in date than the end of fourteenth century."

The uncertainty as to when exactly the gun was first used in Europe applies also to India. But the common myth to the effect that Babar was the first to introduce the guns into India now stands completely exploded. What, however, may be said of Babar, is that he used the artillery arm intelligently in a tactical role. There is otherwise plenty of evidence to show that the gun was known in Deccan and other parts of the country long before the first battle of Panipat.

UNIFORMS OF THE INDIAN SOLDIER—V

By Major F.G. Harden

ARTILLERY

THE artillery of the East India Company was always dressed in blue, with red facings and yellow lace.

At the commencement of the nineteenth century, the Horse gunners wore white breeches and black Napoleon boots, the Foot Artillery had blue trousers with red stripes, or white cotton. About 1830, the breeches were replaced by blue overalls with red stripes and Wellington boots.

The Horse Artillery wore jackets heavily laced with yellow cord and the Foot wore coatees laced by eight bars of yellow tape. Collars were red, outlined with yellow, and cuffs were red, pointed for Horse and infantry-pattern for Foot. Trumpeters were distinguished by having scarlet coats.

The head-dress of Bengal Horse Artillery was a high pointed black lamb-skin cap. Madras Artillery had bulbous basket-hats, red for native officers and blue for gunners and Horse Artillery drivers. Bengal Foot Artillery and Bombay 'golaundaz' had blue flat-topped basket-hats, six inches high and eleven across the top.

These hats were ornamented by curb-chain or yellow tapes and brass star badges for full-dress. On other occasions they were worn with a cloth cover — black till 1840, and afterwards white.

In the Bombay Artillery, an undress cap was also provided, made of blue cloth widening out at the top with a chin-strap and brass cannon badge in front.

The brass buttons were impressed with the device of three field guns within a garter bearing the title.

Both the brass rectangular waist-plates and cross-belt plates were, like the buttons, distinctive to each corps. They bore their designation, badge, battle-honours etc.

The gun lascars had a blue shell-jacket with collar and cuffs as for Foot and black waist belts.

For many duties white cotton 'angreekas' were worn by all.

Drivers of Foot Artillery were more simply dressed—in Madras a blue blouse with red collar, cuffs and kamarband, plain red basket-hats and white trousers.

About 1855, the corps buttons were replaced by a universal artillery pattern, displaying the three cannons within a laurel wreath. The artillery of the Hyderabad Contingent, however, had their own pattern which they wore until their disbandment at the close of the century.

After 1860 Indian Artillery were dressed in tunics similar to those of the Royal Artillery and pagris, red or khaki for mountain batteries, blue for Hyderabad.

The later blue and khaki jackets were cut like those of British troops and fastened by four buttons only, and these of a new design with a single gun under a Crown and 'Native Artillery' impressed round the edge. Brass shoulder-titles bore the numeral and initials of the battery.

The red collars were piped with yellow cord and the cuffs had a yellow 'Crow's foot'; a grenade appeared upon the shoulder-straps until about 1883, after this it was transferred to the collar.

The blue knickerbockers had broad scarlet stripes.

Blue putties, adapted about 1880, were worn with khaki till about 1900, after which khaki ones were issued and Royal Artillery buttons replaced the 'native artillery' ones.

With the khaki pagri a red fringe was worn at the left side.

Until 1860 the Indian gunners' equipment was made of pipeclayed buff. This was replaced by brown leather. A brass-hilted cutlass was suspended from a shoulder-belt and kept steady by a waist-belt: the former was adjusted by a brass tongue-buckle, the latter by a brass snake-hook originally—later, also by buckle.

About 1903, gunners received carbines and bandoliers in place of cutlasses: drivers retained the old cutting weapons.

In 1927, brass letters 'R.A' replaced the battery shoulder-badges. The 1st, Royal Kohat, M.B. was allowed, as a special mark of distinction, a brass Crown over the R.A.

A few years later a new type of battery emblem came into fashion. It was made of brass and worn on the point of the left shoulder (helmet of British officers) over a diamond shaped cloth 'flash' divided red and blue.

It should be noted that these battery shoulder flashes were worn by Indian soldiers of Indian mountain batteries and also by Indian personnel of British batteries—Horse, Field, Pack and Medium.

For the Indian Field Artillery Regiment, formed in 1935, there were special badges. For head-dress, a cannon under a star and motto 'Iqbal o Izzat' was issued and, for the shoulders, the word 'Artillery'—both in brass.

The badge worn in the 'Cap G.S.' was a brass grenade over scroll 'India', backed by red cloth.

Some of the battalions in World War II—converted to artillery from infantry, retained their former badges. The 8th Sikh L.A.A. Regt. was an exception. They adopted a silver badge displaying a Crown, quoit and title-scroll.

The button design was a cannon below a star.

ENGINEERS

The early Pioneer corps of the Presidency armies wore green jackets with black facings and trousers. After becoming Sappers & Miners, they adopted the red, blue-faced tunics and jackets of British Royal Engineers.

The Madras sappers were distinguished by their special high black cylindrical hats. The Bengal and Bombay wore blue pagris and red kullahs. Jackets were worn short and blue putties were worn with full dress and khaki.

In both the Bombay and also the Burma company khaki field caps were frequently worn, the latter with a brass grenade badge and title scroll. The Indian officers of the Madras corps wore very globular shaped pagris with a gilt badge in front.

After 1906 the 1st S&M adopted the Prince-of-Wales plume as a pagri badge.

From about 1860 Indian ranks of all three corps wore buttons impressed with a Crown in a broken ring and laurel wreath but, later, each corps had its own design. Each also had its own distinctive brass shoulder-title. In the case of the 1st S&M this included the company number. Railway and Signal companies of the S&M had also each their own special brass shoulder-titles.

When the three corps were merged into the Indian Engineers, a brass badge consisting of a five-pointed star within a laurel wreath was adopted. It was worn on caps G.S. mounted on a blue cloth circle.

SIGNALS

The Indian Signal Corps, formed in 1925, had only service dress. Madrasi units wore felt hats. The shoulder-title was 'signals'.

A head-dress badge, based on that of the Royal Corps of Signals, was also used. This, when worn on felt hats or caps G.S. was mounted on a flash divided horizontally dark blue-light blue-green.

ORDNANCE

Lascars employed by the Indian Ordnance Department had no official uniform but usually dressed in khaki. They were supplied with a heavy brass brooch to be pinned into their pagri as a badge of office. The design was a hand emerging from a mural crown and gripping a thunderbolt.

When performing police duty at arsenals, etc. lascars were usually armed with a thick bamboo 'lathi'.

In 1922, when the Indian Army Ordnance Corps was formed, sepoys were issued with brass titles 'I.A.O.C.' Later came brass pagri badges.

TRANSPORT

Indian ranks of the Supply and Transport Corps had only khaki drill clothing—no full-dress.

Transport corps and cadres were distinguished by different coloured pagri fringes and kullahs. Brass shoulder-titles showed the unit number followed by MC (mule corps), CC (camels), BT (bullock troop), TC, etc. Buttons were plain brass, slightly domed.

Some few corps, however, had individualities, for instance:—

9th Mule Corps	had special brass shoe buckles engraved IX.T.C.
22nd Mule Corps	had brass buttons embossed XXII TC.
34th Mule Corps	wore, instead of shoulder-titles, large brass 34 in pagris.

N.C.O. chevrons were blue and they wore green kamarbands. Duffadars were armed with a cutlass and drivers with Snider sword-bayonets.

The Indian Army Service Corps were issued with brass shoulder-titles 'I.A.S.C.' but, after 1935, these were replaced by ones having a brass Crown over 'RIASC'.

A brass badge, worn on a yellow cloth circle, was made for use in the cap GS.

MEDICAL

Although full-dress uniform was worn up till 1915 by officers of the Indian Medical Service and assistant-surgeons of the I.S.M.D., none was worn by men of the Army Bearer Corps or Army Hospital Corps, who

were dressed in khaki. The former had a red fringe on the left of their pagris and the latter a blue one.

The latter corps wore in front of their pagri the script letters AHC in brass.

The Army Bearer Corps had large brass letters ABC over a numeral which denoted the division to which they were allotted. These badges were not, however, worn upon the shoulder-straps, because the weight of a filled stretcher would have driven the metal into the man's flesh, but on the upper sleeves. Another variety seen consisted of the script letters ABC and were pinned on to the pagri. These were probably issued after 1914.

ABC men carried a kukri on a brown leather belt which fastened by a special brass union-locket. The central portion had a raised Tudor Crown and the full title was embossed round the ring portion.

'Other ranks' of the Indian Hospital Corps, formed from the former ABC and AHC, were issued with brass titles I.H.C. and company number (1 to 10).

The Indian Army Medical Corps, formed during World War II, had a brass badge, based on that of the RAMC, backed by maroon cloth for wear in caps GS.

REMOUNT AND VETERINARY

Distinctive badges for these services were authorized and worn upon head-dresses when desired.

The device of a horse was chosen for the Remounts and one displaying Chiron for the Veterinaries.

OTHER LATER CORPS

The Indian Electrical and Mechanical Engineers, Indian Military Police, Indian Intelligence Corps and Indian Pioneer Corps were all formed between 1940 and 1945.

Distinctive brass corps badges were worn in caps by all these newcomers.

AIRBORNE TROOPS

Indian parachute battalions were distinguished by maroon berets and cap badges like those of British parachutists but with the word 'India' embossed on them. Battalions of infantry regiments, however, which were

converted to parachute battalions, used the old regimental badge. The 4th (Para) Bn, Rajputana Rifles had these made smaller than those of other battalions and in white metal instead of black.

STATE TROOPS

Many of the Independent Indian States maintained troops. Their equipment and clothing varied very considerably. The pick of these units were in time of war (and sometimes for training) voluntarily placed by their Rulers at the disposal of the Crown and, though armed and dressed in similar manner as the British-Indian army, alongside which they fought, had their distinctive badges and minor differing details of uniform. These 'Imperial Service' troops included Cavalry, Camelry, Artillery, Sappers, Infantry and Transport corps.

FRONTIER GUARDS

The North Eastern and North Western frontiers—also certain other wild areas within India, were watched by numerous quasi-military local bodies, designated Rifles, Scouts, Militia, Levy corps, Military police, etc., etc. Some were on a whole-time basis, others part-time. For the most part their armament was obsolescent regular army issue, their clothing khaki, and their headgear pagris, kilmarnock caps or felt hats, as might be appropriate for the users. Metal badges or shoulder-titles provided distinguishing marks. At the time of Partition, beret caps with badges were being introduced.

(Concluded)

BOOK REVIEWS

An Introduction To Strategy

by General D'Armee Andre Beaufre,

(Faber and Faber, London; 1965) 138 P., Price 25 sh.

Nuclear War

by Neville Brown,

(Pall Mall Press; 1964) 238 P., Price 35 sh.

A proper understanding of strategy—defined in the first book reviewed as the dialectic art of using force—has long ceased to be the sole concern of Commanders-in-Chief. In this era of proliferating nuclear armament, statesmen, heads of government, as well as the defence forces, not to mention the man in the street, are all concerned with some aspect of strategy. One of the most urgent needs in this country is for a wider and better understanding of strategy and its implications on national life and external policies.

General Beaufre's exposition is an intellectual survey of the fundamentals of strategy. There is an urgent requirement for a suitable institute in the country to promote strategic studies. Our official attitude towards strategy prior to 1962 was more reminiscent of the short-sighted old lady's reaction on first meeting a giraffe. Today, we are all considerably the sadder. Are we wiser? General Beaufre's little book is a fine introduction to a study of strategy and an inspiration to make a similar study in relation to our conditions.

The need for a viable strategy is basic: it should be the bone-structure of international policy. The flesh and blood lie in the industrial base and effective technological application. Neville Brown's book deals with the various strategic options—and lack of options—open to modern highly industrialised nation states. It is not merely necessary to keep abreast of a potential enemy in terms of force in being. Technological parity is even more essential. This is a complex matter but the summation of it is that survival lies in the ability of nations to foster scientific genius and its application in the defence field so as to deter all aggressors.

Mr Brown's highly scientific and extremely competent little book is essential to any study of present-day defence study. Its title is misleading as he covers the whole gamut of modern war between technically advanced nations. His conclusion is that the survival of mankind lies in the strengthening and furtherance of the collective security system as embodied in the United Nations Organisation and the abnegation of the use of force except through the world body.

—MRPV

Religion in the Soviet Union

by Walter Kolarz

(Macmillan London; 1961). 518 p, Price 50 sh.

Notwithstanding the Marxian dictum of religion being the opium of society and several official attempts to eliminate the religious ideologies and institutions from the heartland of Marxism—the Soviet Union—'the other Russia', the Russia of 'believers' as has been explained by Kolarz in his detailed study is a reality today. Drawing his data from a mass of published and unpublished materials as well as from the interviews the author shows how the religious institutions have been given political recognition and legitimacy by the State during the last two decades.

This recognition to the churches and some other religious organisations by the State has not been without its own vicissitudes. During the first decade following the 1917 rebellion, religion was not persecuted. In fact its pursuance was tolerated. With the introduction of radical reforms in the socio-economic spheres during 1928-29 and later, religion came under severe attack by the party. Several ways and means were found to annihilate it altogether. To what extent had the League of Militant Godless—an atheist organisation in search of its followers—succeeded in this task was a debatable point. Thus when every Soviet citizen was asked to state whether he was a believer or not in a census questionaire in 1937 it was thought that as a result to the atheist movement very few Soviets would dare to proclaim their religious beliefs openly. The official assumption was belied for, according "to reliable evidence", about fifty million Soviet citizens proclaimed themselves as "believers".

With the beginning of the Second World War, the Soviet Union seems to have suspended its anti-religious activities as it needed the support of the 'believers' as much as of non-believers to fight on the Soviet front. After the conclusion of the war the State decided to exploit rather than exterminate (a task in which it had not in any case succeeded earlier) the religious institutions. That it has been able to do so to a great extent is evident from the way it has 'controlled' the ecclesiastical dignitaries' statements. "The church", according to Kolarz, "has been expected to express publicly its agreement with the Soviet stand on any major international issue, especially when countries with an orthodox population were involved... Thus, the Patriarch who had to remain silent about the persecution of ethnic groups of the Soviet Union, called upon the British Government to respect in Cyprus the principle of self-determination of small nations". The church has also been used by the Soviet Russia to draw the uncommitted Afro-Asian countries closer to the communist camp.

The price for survival thus is being paid by the church in the Red State. However, according to the author, the church has gained more than lost in this bargain. The security of its existence as an institution as a result of its 'conciliation' with the communist government has ensured the continuity in the training of the priests and the chiming of the bells. No doubt, the communist infiltration within the ecclesiastical organisation as well as the attempt of the State to "starve it intellectually" by confin-

ing its activities within the four walls of the church has posed a serious challenge to its sustenance. Still, the author feels that nothing can detract the church from continuing its great religious mission of consoling "millions of souls", whatever be the hazards.

—UP

Lord Haw Haw and William Joyce; The Full Story

by J. A. Cole

Faber and Faber, London; 1964) 316 p., Price 30 sh.

Two decades after the end of World War II, one has to make an effort to understand the hatred of Lord Haw Haw by the people of Great Britain. To them he had become a public enemy only slightly less abhorrent than Hitler and members of the Nazi High Command. The hatred had its origin in the fact that William Joyce, Lord Haw Haw, was an American national who had lived in Britain as a British national, had gone to Germany just before the outbreak of the war on a British passport and once there, had tried to undermine British morale by his Germany Calling broadcasts.

In this possibly first dispassionate study on William Joyce, J. A. Cole gives a racy account of Joyce's life not only in Britain but even in war time Germany. Considerable effort must have been made to reconstruct Joyce's life there. Apart from the political aspect which has been dealt with in great detail—his disillusionment with Mosley and his followers and then with the Nazis, what grips the attention is the human aspect—a self-confessed traitor leading a none-too-happy married life in a land where he had gone with hopes which speedily turned to dupes.

About the effectiveness of the Haw Haw broadcasts, the writer comes to a conclusion none-too-complimentary to the British public. He feels that with Nazi hordes overrunning Poland, Holland, Belgium, Denmark, Norway and France, the British public gave to the Haw Haw broadcasts an importance totally unwarranted by their content or propaganda value. The most fantastic rumours were attributed to Haw Haw. The British listeners first listened to these broadcasts with an air of amusement which changed to near-hysteria as the Germans conquered country after country. Their image of Haw Haw as the all-knowing, vicious Briton who had sold himself to the Nazis, he feels, was out of all proportion to reality. But how can one judge in the sixties, the effect that these broadcasts had on the British public in the early forties when all seemed lost to them?

The book is interesting for the casual reader but it is of great value to the professional propagandist in knowing what mistakes to avoid in his work.

—KGJ

KOHIMA

by Arthur Swinson

(Cassell, London; 1966) 275 p., Price 30 sh.

This story of Kohima, which is undoubtedly one of the most fierce battles of the last war and which brought the Japanese in their forward march to Delhi to the very door-step of India, has been told in a very refreshing manner by one who himself took part in it. It was a battle in which the Japanese, in a most daring bid, overcame all the natural terrific barriers on the way and fought on most doggedly until the last. Even their rearguard action has few equals and can very well be compared to Thermopyale. Why was it that the Japanese failed and how the British, from virtual scratch, were able to build up and then push the opponents away into a death march towards Rangoon, is a story that has to be followed here in all its grim reality. In his inimitable style the author has succeeded in portraying the drama of those fateful days which virtually shook the British Empire particularly when the Indian National Congress was totally against the war effort.

Having observed the performance of the Japanese during the last war one may not entirely agree with Field Marshal Slim who fought the battle at Kohima and then further down into Burma, that the fundamental fault of the Japanese generals was the lack of moral as distinct from physical courage. The main causes of the Japanese reverses at Kohima would seem to be the clash of personalities between Sato and Mutaguchi and the rigidity displayed by Kawabe who did not permit the local commanders to include Dimapur in the area of operations. Such a rigidity was displayed many a time during the last war and cost the parties all that they had put at stake. But what if the local commander had disobeyed, gone ahead and captured Dimapur? This will undoubtedly remain one of the 'Ifs' of the history of war.

Many would agree with the author's desire to see peace in the Naga Hills for they 'have seen enough bloodshed to last for many centuries'. It is interesting to note that the troops fighting in the area were predominantly British (2nd British Division) and this fact was intentionally played down at the time to placate the Indian public opinion. Newspaper accounts of the fighting made references solely to Indian troops which caused much heartburning, particularly among the troops fighting there.

The chapter 'Four Generals, one Rendezvous' about Montagu Stopford, and John Grover on the British side and Kotuku Sato and Renya Mutaguchi on the other side, is very revealing and helps one in better understanding of the campaign that follows in the succeeding pages.

The author has brought forward sufficiently new material for a better understanding of the battle of Kohima. So much has been written about Alamein and Cassino and so little about Kohima which was no doubt one of the turning-points of the last war. There is no doubt that the present work fills a gap in the history of the last war.

—G.S.

CAPORETTO

by Ronald Seth

(Macdonald, London; 1965) 208 p., Price....

This book gives an account of the part played by Italy in the First World War. The battle of Caporetto—the events leading up to it, the defence taken at River Piave, and the eventual driving back of the invading forces, are narrated in a very interesting way.

Two points have been high-lighted—the reasons for Italy throwing in her lot with the Allies in May 1915, were not ignominous, and Caporetto, though a defeat, but it was a glorious defeat. It may perhaps have been better to dedicate this book to the people of Italy, whose image, Ronald Seth has gone to considerable length, to salvage.

This book is a must for anyone, who is inclined to have a fresh look at the part played by Italy in the First World War, from a fresh angle.

—RDA

A ROLL OF HONOUR

by GS Elliott

(Cassell, London, 1965) 392 p., Price 36 sh.

BEFORE THE COLOUR FADES

by Fred Ayer

(Cassell, London; 1965) 199 p., Price Rs. 16/-

The first book is a general's story of the Indian Army during World War II from 1939-1945. In fact it continues up to 1947, when all but less than a handful of British Generals laid down their Indian Army batons. Most, if not all of them, did this with considerable trepidation. Fortunately for India most of their understandable doubts—though certainly not all—have been laid to rest during the past 20 years, through the dedicated and untiring efforts of their Indian successors. This book provides a useful outline guide to the various campaigns and theatres in which Indian troops fought during World War II. It also provides a sound motivation for pride of Regiment in young officers of today who, on reading this book, should derive a fierce determination to add fresher and greener laurels in the years to come.

The second book is a man's story of his favourite General, George S. Patton. The story of this able general whose colourful personality is more reminiscent of the American Civil War than of the sober characters of World War II, is the record of a man who never followed another man's opinion unless he shared it; who followed his own star; who never hitched himself to any other person's wagon and never felt that a bold utterance needed an apology. Perhaps the greatest need

in our own high command today is for three versions of Patton—one for each Service—to sit in the Chief of Staff Committee! Naturally they should come in succession and not all at the same time, the reasons for which will be obvious on reading this book!

—MPRV

MAKERS OF DISTINCTION—SUPPLIERS TO THE TOWN AND COUNTRY GENTLEMAN

by Thomas Girtin

(Harvill Press, London; 1959), 256p., Price 18sh.

In this book, Thomas Girtin writes about the men who make the clothes and sporting equipment for the man of distinction in England, about the origin and development of these trades and of their famous patrons like Edward VII. In a world with its emphasis on ready-made garments preferably of wash-and-wear artificial fabrics, the book makes fascinating, almost other-worldly, reading.

—CASSIUS JOGAVANNI

CORRESPONDENCE

Correspondence is invited on subjects which have been dealt in the journal, or which are of general interest to the Services

I

POST-RETIREMENT EMPLOYMENT

Sir,—In recent months there have been a number of special management courses sponsored by the Ministry of Defence for Service Officers who have retired or are about to retire. These are meant to be re-orientation courses, designed to prepare officers who, on retirement, seek employment in the country's industrial sector, both private and public. This would appear to indicate evidence of Government's awareness of the problem of early retirement and consequent need for full scale earnings after retirement, in the case of Service Officers. Unfortunately, the attendance at such a course does not in itself materially enhance an officer's value in the civil market. What he requires, in addition, is effective sponsoring by Government for his placement in a private or public sector concern. As matters stand today, however, the number of affected officers who obtain such sponsoring to the stage of a suitable placement, is of minimal significance in relation to the numbers seeking employment and the majority of these therefore have to fend for themselves. Assuming Government's inability to do much more in the way of effective sponsoring than they are doing at present and therefore accepting as inevitable, the continuation of the existing pattern of employment-finding by retired Service Officers, something needs to be done to make their task less difficult than it is today.

One step in this direction would be for the Ministry of Defence to translate, for civilian understanding, the comparative value in a commercial or industrial undertaking, of a Service Officer's experience and qualifications. To the average civilian—and it must be remembered that the average civilian in our country, unlike his counterpart in most Western countries, has had no personal experience in his country's Armed Forces —a list of service appointments held and qualifications obtained, conveys nothing recognisable. To him, far too often, a Service Officer is one ideally suited for the post of a Security Officer or some similar appointment where physical prowess, stamina and other "outdoor" qualities are required. He cannot think of him as an effective executive at a desk, since he has little or no idea of what his range of responsibilities in the Service were, the extent and the value of the experience he has gained, his knowledge of man-management and human relations generally, the type of work he has handled in which he has had to deal with financial and budgetary matters, skilled and unskilled labour, planning and execution of construction projects of various kinds and the training he has undergone which has given him the ability for quick-thinking and decision-making. One could add on to this list of subjects a Service Officer has had to deal with at some time or the other during his service career and find that it covers practically everything that he could be called upon to deal with in a civilian capacity in either the public or the private sector. While there is little significant difference in the type of subjects dealt with, such

differences as do exist, arise from a difference in methods, organisational and procedural, in forms of "communication" and in the degree of response from subordinates. To these, the average retired Service Officer is able to adjust himself in a reasonably short period.

The need, therefore, is for the Ministry of Defence to publish a short pamphlet, explaining in terms recognisable to civilian readers with no previous knowledge of the Defence Services, the employability value of the training and experience acquired by a Service Officer in various command and staff appointments at the several rank levels. With many of the major commercial houses now entrusting their recruitment problems to firms of Management Consultants, it would perhaps be worthwhile to engage the services of such a firm to help in the preparation of the pamphlet, so as to ensure that it is written in a manner which makes it's purpose clear to civilian management.

Brigadier A. J. R. DYER (Retd.)

"SUMMIT VIEW"
BANDRA HILL
BANDRA
BOMBAY-50
March 16, 1967.

II

LAWRENCE OF ARABIA

Sir,—I was interested to read Major SHAHANI's article on "Lawrence of Arabia" which was published in the July/September edition of the Journal. Lawrence has interested me for as long as I can remember, and certainly long before I went out to Jordan in 1952 to raise and command an armoured car regiment in the Jordanian Army (then known as the Arab Legion). My regiment was recruited very largely from the same tribes as those who rallied to Lawrence to drive the Turks out of Syria and I never lost an opportunity to meet and talk with those Arabs who had served with him. I was also able to visit many of the scenes of his exploits, while in the course of my journeys in the desert by camel I learnt to appreciate Lawrence's incredible stamina and physical toughness.

He was certainly a most remarkable man. Despite the attacks made on his character in Richard Aldington's lamentable book, no man could have numbered among his close friends such men as Winston Churchill, Wavell, George Bernard Shaw, Liddell Hart, Thomas Hardy, E. M. Forster, and Lord Trenchard without being a much out of the ordinary personality. None of the above were men who were likely to give their friendship to a charlatan or *poseur*.

On the other hand I believe that Lawrence suffered from being written-up too much after the First World War. Too much was made of his strategy, which was in any case forced on him by his circumstances, as Major SHAHANI has brought out. But this is understandable if we remember the revulsion of feeling after that war for the generals who plan-

ned the Somme and Passchendaele. Lawrence's campaign may have been a "sideshow" but at least he did not waste lives in pursuit of his aim. This gained him a reputation which was certainly inflated.

Nonetheless he was a leader of men and a profound student of military history, and no-one who has served with Arab tribesmen would ever underrate the difficulties he faced and successfully surmounted. He was certainly a much stronger character than the Lawrence portrayed by Peter O'Toole in that excellent film, "Lawrence of Arabia".

Lawrence was an introvert with the complex character of a genius. Had he lived long enough to play an active part in the Second World War, he might have achieved far greater fame than he did in the first one, and in view of his friendship with Churchill it is almost certain that he would have been given his opportunities. Instead he died on his motor-cycle while still serving in the ranks and we shall never know the answer. But as one old **bedu**, who had ridden with him to Damascus, said to me in 1953: "Of all the men I have ever met, he was the only real Prince".

Not a bad epitaph 35 years after!

Major-General J. D. LUNT, CBE

NEW DELHI,
13th March 1967

III

OUR MILITARY TRADITIONS

Sir,—As a Regimental Officer I fully endorse the views expressed by Brigadier A. B. McPherson, CBE, MVO, MC, in his letter which appeared in the last issue of the journal, regarding the difference between NATIONAL and UNIT traditions.

Even today some of us would rather forego promotion and other benefits to be in a particular battalion or regiment because of its traditions, than be transferred to another. One may say that it is not a worthy attitude. But it is a matter of sentiment, of emotion, and I suppose even a soldier may at times be tolerated to have some and this is one of those.

It has not been the practice to attach any importance as to the race or nationality of those who set these regimental traditions be they Indians, Gorkhas or the British as long as they belonged to the regiment. These traditions in many cases are reminders or commemorations of some brilliant action fought by the unit in which lives have been sacrificed and are not just empty words or imaginations. These men irrespective of their ethnical or religious background, fought in these battles; whatever the cause may have been, they believed in it, they obeyed and did their best; the like we are supposed to do now.

In following these Regimental traditions we therefore do not ask as to what was the ethical basis of fighting such and such battle or of inci-

dence from which these traditions may have arisen, we may only remember and admire those wonderful men, their soldierly qualities, their courage and their devotion to duty. We draw inspiration from them and try to be better men than we actually are, so that we may also some day pay our debts as they did.

I accept that perhaps "Our Army after Independence has emerged a more valorous, more courageous, a more competent Army" but I do not accept an attitude so smug as to suggest that all credits are due to us only and the British could not have dreamt of making it so. May I very humbly suggest that it is not necessary for history to teach us, as we know it only too well, that apart from dreaming the British Officer of the Indian Army had put in a lot of hard work behind what our Army is today. I also suggest that it should be our normal attitude and good Indian tradition of being polite enough to accept it gracefully apart from the fact that we may very gainfully follow their example.

The fact is that ours is not a new Army like some of the others and we may rather accept the fact that the British did forge this weapon, the Army, well, whatever the use it may have been put to in the past. It may be a little sharper now, depending on how it is used but it is certainly the same old weapon and we are proud of it.

Lt.-Col. P. K. CHAKRABARTI

HQ EASTERN COMMAND
FORT WILLIAM
CALCUTTA-21
20 Feb. 67

IV

SOME THOUGHTS ON MINE WARFARE

Sir,—I have gone through the interesting article of Maj. SCN JATAR on "Some Thoughts on Mine Warfare" in your July-Sept. 66 issue.

The information given in the following paragraphs may be of interest to the readers of the USI.

During September '65 our unit was given the task of laying defensive mine field in a location at 13,000 ft. In the orders, the maximum time given was 65 hrs. to cover a frontage and depth of 350 yds. and 250 yds. respectively with 270 full clusters and 30 single clusters. The vertical height covered between the nearest enemy strip and that of home side trip was about 800'. Actually our Unit Field Platoon did the job continuously in 54 hours.

The live A/P mines with trip wire were laid in Sept. and lifted exactly after a year. During snow season the mines were covered by fresh snow up to 4' to 5' depth. I have carried out personally the lifting operations and I have noticed that the mines were still undisturbed either by

snow or by ground conditions. The lifting was done only by hand and it was not feasible to use any mechanical means due to ground conditions. We were unable to use even mine shoes.

From the above paragraphs, it will be seen that even advance information for 5 to 7 days was not given. Moreover, it is not possible to cover all approaches in a mountainous terrain by mines. Only likely approaches can be covered by mines.

Thus the sappers always do the difficult job immediately, impossible taking a little longer.

Capt. R. KRISHNAN

ASSTT. GARRISON ENGINEER
VEHICLE FACTORY
POST ADHARTAL
JABALPUR
22 March 1967.

V

STAFF UNIT RELATIONSHIP

Sir,—I read with interest Major KAUL's article on "STAFF UNIT RELATIONSHIP".

I do not think that an SO 2 (coordination), if authorized, will be able to solve the problem of coordination. It will only add to official delays and red-tape. The answer to avoid duplication is to have good staff officers at all levels. After all the system of Circulation Files is meant to keep everyone in the picture. Whenever there is lack of coordination, it is because proper selection is not made—this applies to selection at the DSSC as well as by the MS.

It is absolutely incorrect to say that an incompetent CO can command a fine outfit. The outlook of commanders at all levels is reflected in the units they command. This is also true of staff—the outlook of the commander and the senior staff officer matters a great deal.

The reasons for bad staff unit relationship are to be found much deeper. We often hear of the attributes of a good staff officer—how many of us fulfil these. The way to overcome the bad state of affairs is to

(a) have good selection for promotion;
(b) recommend for staff college only those who have the makings of good staff officers;
(c) overhaul the system of giving appointments after graduation from Staff College; and
(d) ensure that officers hold equivalent regimental appointments before going on staff jobs.

Major SCN JATAR

No. SCN/8
HQ XXXIII CORPS
C/o 99 APO.
Dec. 66

SECRETARY'S NOTES

Annual Subscription

I would like to thank all those members who paid their subscription so promptly at the beginning of the year. To those of you who have not yet paid, may I remind you that your subscription was due three months ago on the 1st January. Would you please, therefore, put a cheque in the post TODAY. There are some members who have also to pay their subscription for 1966. They are requested to make the payment for both the years to avoid unnecessary reminders.

Addresses

Members are requested to notify changes of addresses immediately to this office. When Journals and correspondence are returned undelivered by the post office we have to write to the Service Headquarters concerned and it takes some time before we get the new address.

New Members

From 1st January 1967 to 31st March 1967 the following members joined the Institution:—

AGGARWAL, Captain P. K., Engineers,
ANAND, Major K. K., Artillery
BAKSHI, Major O. P., Engineers
BAMEZAI, Major A. K.
BINDRA, Captain P. S., The Punjab Regt.
CHANDIRAMANI, Major G.
CHANDSARKAR, Major D. A.
CHATURVEDI, Captain A., Para Regt.
CHHIBA, Major R. C., Sikh L.I.
CHOUDARY, 2/Lieut. P. T., Engineers (Life)
EAPEN, 2/Lieut. P. G., The Maratha Regt.
GODBOLE, Captain B. N.
KANWAL, Major S. B., The Kumaon Regiment.
KULKARNI, Major P. S., A.S.C.
MAN MOHAN SINGH, 2/Lieut., Signals
MIRCHANDANI, Shri G. R.
NIRODI, Captain A. S.
PRABHU SINGH, Captain, The Rajputana Rifles
SADHU SINGH, Captain, Artillery
SAMPATH, Captain A., Engineers
SINGH, Major J. R., Engineers
SINGH, Major R. K., Signals
SRIVASTAVA, Major K. L.
SURINDER SINGH, Captain, 45 Cavalry
VASISHTHA, 2/Lieut. S. C., Engineers
VIRK, Major G. S., The Sikh L.I.

Eleven officers' messes and institutions were enrolled as subscribing members during this period.

ADDITIONS TO U.S.I. LIBRARY

January-March, 1967

Title	Author	Year of Publication
Akin to Treason	John Bulloch	1966
The Battles of Panipat	Gulcharan Singh	1966
Crisis in Kashmir 1947-1966	Alastair Lamb	1966
General Elections in India, 1967	M. Pattabhiram. ed.	1967
Ghadar 1915	Khuswant Singh and Satindra Singh	1966
India; A Reference Annual 1966	Min. Of Information and Broadcasting, India	1966
Military Year Book	S. P. Baranwal	1967
The Road to Delhi	M. Sivaram	1967
Security in the Missile Age	J. K. Ray	1967
The State of Pakistan	L. F. Rushbrook William	1966
Studies in Medieval Indian History	Kishori Saran Lal	1966
The Untold Story	B. M. Kaul	1966
Why Communists ?	S. G. Sardesai	1966
Why Congress ?	S. G. Barve	1966
Why Jana Sangh ?	Balraj Madhok	1966
Why Praja Socialists ?	N. G. Goray	1966
Why Samyukta Socialist ?	Madhu Limaye	1966
Why Swatantra ?	M. R. Masani	1966
Winston Churchill	Lord Moran	1966
Words of Wisdom on War	Rajendra Singh	1966

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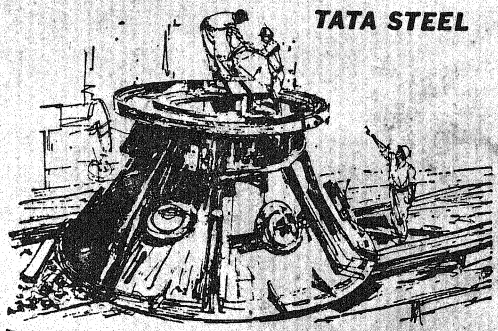
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